DOCUMENT RESUME

ED 340 899 CE 060 062

AUTHOR	Dimmlich, Dave
TITLE	Task Analysis for Industrial Occupations, 1988: Education for Employment Task Lists.
INSTITUTION	Lake County Area Vocational Center, Grayslake, IL.
SPONS AGENCY	Illinois State Board of Education, Springfield. Dept. of Adult, Vocational and Technical Education.
PUB DATE	88
NOTE	458p.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC19 Plus Postage.
DESCRIPTORS	Behavioral Objectives; *Computers; Desktop Publishing; High Schools; *Machinists; Numerical Control; Occupational Information; *Photocomposition; Postsecondary Education; *Repair; State Standards; *Task Analysis; *Technical Occupations; Vocational Education
IDENTIFIERS	*Computer Technicians; Illinois

ABSTRACT

Developed in Illinois, this document contains task lists for three occupations: (1) machinist in the manufacturing cluster; (2) compositor and/or typesetter in the graphic communications cluster; and (3) computer repair technician in the electronic occupations cluster. For machinists, the guide analyzes 46 tasks in the duty area of operating numerical control/computer numerical control machines. For compositors/typesetters, 43 tasks are analyzed related to programming and setting up phototypesetting, digital, and desktop publishing equipment. Analysis of 77 tasks in the duty area of servicing computer equipment is provided for computer repair technicians. For each task, the following are provided: performance standard, steps to be performed, knowledge and attitudes required, safety requirements, equipment and materials needed, source of the analysis, and the related Illinois State Goals for Learning. (KC)

****
*   Reproductions supplied by EDRS are the best that can be made   *
*   from the original document.   *
****

ED340899

Education
for
Employment
Task Lists

Illinois
State Board of
Education

Adult
Vocational and
Technical Education

1988

TASK ANALYSIS
FOR
INDUSTRIAL OCCUPATIONS

CE060062

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY
K Bowman
TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

IL88CD04 019101

Education
For
Employment
Task Lists

Illinois
State Board of
Education

Adult
Vocational and
Technical Education

1988

TASK ANALYSIS
FOR
INDUSTRIAL OCCUPATIONS

CLUSTER: **MANUFACTURING**
OCCUPATION: **MACHINIST**
Duty Area: Operating NC/CNC Machines

"KEY TO EFFECTIVE LEARNING"

Illinois Competency Based Vocational
Education Project
Housed At: Lake County Area
Vocational Center
19525 West Washington Street
Grayslake, IL 60030-1194
(312) 223-6681 or 620-8770

Tasks Analyzed by CBVE Industrial Occupations Consultant	Dave Dimmlich
CBVE Project Director	Urban T. Oen, Ph.D.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Turn on/off power

PERFORMANCE STANDARD Power to NC/CNC machine must be turned on/off in accordance with manufacturer's procedure and specifications. Control lights or indicators must respond when switch is ON.

STEPS

1. Locate master control switch on console or machine panel.
2. Inspect work holding area and tool holding area for position, to avoid possible collision when machine is turned ON.
3. Position control switch to ON.
   NOTE: Some NC/CNC machine tools have a power up checklist which may differ from the steps listed here. Follow the checklist for your particular machine.
4. Jog machine tool in all directions to make sure that all slides move freely and collision will not occur.

CAUTION: Move the machine tool slowly and be ready to stop the movement if collision is about to occur.

5. Check the operation of the coolant pump and system by activating the coolant controls.
6. Observe control panel for start positions shown on display.

KNOWLEDGE

Identify types and operating controls of NC/CNC machines.
Identify and demonstrate the procedure for turning on/off power to NC/CNC machines.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Work without the need for close supervision.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Follow written and oral directions.
Display respect for tools, equipment and machines.
In addition, refer to Employability Skills List.

SAFETY

Use care when turning on the machine that the tool does not run into the workpiece, work holding device or machine.
Identify and follow safety requirements for working around automated machinery.
Maintain a clean and orderly work area.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Technical references
Job specifications
Machine tool

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 58.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 58.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
  Goal 1-A: Recognition, recall, and summarization of material read.
  Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
Physical Development and Health:
  Goal 3-A: Safe and appropriate use of equipment in physical activities.
  Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
Mathematics:
  Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Call up program in distributed numerical control

PERFORMANCE STANDARD When cycle start is activated, CNC program must be available in machine memory to produce workpiece.

STEPS

1. Turn on CNC computer and main computer if necessary.
   NOTE: Consult computer and CNC machine tool operator's manuals for procedures to turn on main computer and CNC machine computer.
2. Enter code name or number for entering software system on main computer.
3. Call up directory of DNC programs available on main computer.
4. Call up assigned DNC program from the main computer directory.
   NOTE: Check machine tool operator's manual, computer systems format classification sheet and software manual for specialized systems instructions.
5. Load assigned DNC program in main computer memory.
6. Check DNC program in main computer:
   a. Check for condition of program.
   b. Contact supervisor and/or CNC programmer if program is not available or if problems occur.
7. Prepare machine tool to receive CNC data.
   NOTE: Consult computer and machine tool operator's manuals for specific system instructions.
8. Download CNC data from main computer to machine control unit.
9. Verify that CNC data is available in machine control unit.

KNOWLEDGE

Identify technical terms associated with computers, computer programs and CNC machine controllers.
Identify and demonstrate the method of configuring the CNC machine controller to accept program from main computer.
Read and interpret technical references to determine specific CNC machine tool and main computer system instructions.
Explain the operating principles and functions of local area networks (LAN's) and computer protocols.
Read and interpret job specifications and orders.

ATTITUDES	Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. In addition, refer to Employability Skills List.
SAFETY	Identify and follow safety requirements for working around automated machinery.
EQUIPMENT AND MATERIALS	CNC machine tools Main computer Software Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, *Computerized Numerical Control*, Performance Objective 59. V-TECS Curriculum Guide, *Computerized Numerical Control*, Performance Objective 59. *New Machining Technology*, Vocational Instructional Services, Texas A&M University, 1986. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Physical Development and Health: Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Place tape in reader

PERFORMANCE STANDARD Tape must feed through read head rollers or sprocket tooth feeder without interruption, tearing, kinking or binding.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify tape to be loaded.
2. Select tape to be loaded.
3. Set tape load switch to OFF.
   NOTE: Tape systems may vary. Consult the NC/CNC machine tool operator's manual to identify the specific loading procedure for your machine.
4. Inspect tape and reader for oil, dirt or other problems which could cause a read error.
5. If problems with the tape or reader are apparent:
   a. Contact your supervisor.
   b. Clean the tape if necessary.
   c. Clean the reader if necessary.
   d. Replace the tape if it cannot be cleaned.
6. Place and clamp take-up reel to spindle.
7. Place and clamp tape supply reel to supply spindle.
8. Place tape in reader.
   a. Pull out leader on tape.
   b. Thread tape through read head.
   c. Attach leader to take-up reel.
   d. Position tape to read eob code at start of cycle.
   e. Check alignment and adjust if necessary.
9. Align tape in guide rollers.
10. Engage tape with spindle drive pins and clamp.
11. Press tape load switch to take up tape slack.
    NOTE: If tape has been wound too tightly to load correctly, rewind tape before attempting to reload into reader.
12. Feed tape to check alignment and adjust if necessary.

KNOWLEDGE Explain the operating principles and functions of tape readers and NC/CNC tapes.
Identify amount of error allowed in alignment of NC/CNC tape.
Identify and demonstrate the method of loading NC/CNC tapes.

KNOWLEDGE (Cont.)

Identify technical terms associated with NC/CNC tapes and readers.
Identify the types and parts of NC/CNC tape readers.
Read and interpret job specifications, orders and blueprints.
Read and interpret machine manuals to determine operating procedures.
Identify the types and formats of NC/CNC punched tapes.

ATTITUDES

Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Identify and follow safety requirements for working around automated machinery.

EQUIPMENT AND MATERIALS

NC/CNC machines
NC/CNC tape reader
NC/CNC tape
Job specifications, orders or blueprints
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 60.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 60.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-B: Sequence of ideas from spoken messages.

Mathematics:
- Goal 1-E: Application of properties of numbers and operations.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Key in program on machine
PERFORMANCE STANDARD	Program to run workpiece to blueprint or job specifications must be keyed into NC/CNC machine memory. When operator calls up program by name, CRT screen must indicate verification of program.

STEPS

1. Read and interpret job specifications, orders or blueprints to determine program necessary to machine workpiece.
2. Determine if program is to be loaded from memory or if it must be keyed in at the machine controls:
   a. If program is to be loaded from storage or memory, go to step #3.
   b. If program is to be keyed in at the machine controls, go to step #7.

IF PROGRAM IS TO BE LOADED FROM MEMORY, FOLLOW THESE STEPS:

3. Read and interpret job specifications, orders or blueprints to identify program name or number.
4. Locate program.
5. Load program into computer memory.
6. Check program to verify that it is correct for job.

IF PROGRAM IS TO BE KEYED IN AT THE MACHINE CONTROLS, FOLLOW THESE STEPS:

7. Read and interpret job specifications, orders or blueprints to identify machining functions and sequence necessary to produce part.
8. Assign program number or name.
   NOTE: Consult NC/CNC machine operator's manual for specific instructions.
9. Write manual program for machining functions and sequence.
10. Determine zero location.
11. Enter G + M codes or consult operator's manual for necessary codes.
12. Enter offset register codes; X, Y, and Z coordinates; and other specific machine codes by line number.
13. Enter code for each written line.
14. Edit program for errors.
15. Load program into computer memory.

STEPS
(Cont.)

16. Dry run program.
17. Edit program for errors, if necessary.
18. Store program data:
    a. On disk.
    b. On tape.
    c. On cassette.
    d. On main computer.
19. Check your work to verify that program is correct for job.

KNOWLEDGE

Identify technical terms associated with computers, computer programs and CNC machine controllers.
Identify and demonstrate the method of configuring the CNC machine controller to accept program from main computer.
Read and interpret technical references and machine manuals to determine specific CNC machine tool and main computer system programming codes and instructions.
Explain the operating principles and functions of local area networks (LAN's) and computer protocols.
Read and interpret job specifications, orders or blueprints.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.
Use Machinery's Handbook or other technical references to determine machining data.
Determine sequence of machining operations.
Select and use formulas and tables to perform machining calculations.
Identify amount of error allowed in program.

ATTITUDES

Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Display pride in workmanship.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Apply general shop safety practices.

EQUIPMENT AND MATERIALS

NC/CNC machine tools
Main computer
Software
Technical references
Blueprints
Job specifications or orders

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 61.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 61.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Align holding device with machine axis

PERFORMANCE STANDARD Work holding device must be square and parallel to appropriate axes, and dial indicator needle must exhibit no movement.

STEPS

1. Turn off power.
2. Clean and deburr work holding device.
3. Clean machine table.
4. Use hoist or lift table to lift work holding device into position if necessary.
5. Align edge of work holding device with machine axis.
6. Snug work holding device down to table.
7. Attach dial indicator to machine spindle using tool holder, collet, arbor or fixture.
   NOTE: See Task 760-X-006-M for detailed information on mounting dial indicators.
8. Position dial indicator contact point on appropriate edge of work holding device.
9. Move machine table the length of work holding device in appropriate axis and observe indicator dial needle for movement.
10. Adjust work holding device until dial indicator needle remains constant.
11. Tighten work holding device to table.
    NOTE: Overtightening of work holding device may cause distortion of workpiece.
12. Check alignment and adjust if necessary.
13. Repeat steps 8-12 for each appropriate axis.

KNOWLEDGE

Identify the types and parts of work holding devices.
Identify NC/CNC machine types.
Identify work holding device mounting methods.
Select accuracy of alignment necessary to complete the job setup.
Explain the operating principles and functions of work holding devices.
Identify technical terms associated with work holding devices.
Identify and demonstrate methods of mounting work holding devices.

KNOWLEDGE (Cont.)

Identify the types and parts of dial indicators.
Identify and demonstrate the procedure for mounting and using dial indicators.
Read and interpret blueprints, job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Follow written and oral directions.
Display pride in workmanship.
Focus attention to details.
Work without the need for close supervision.
Display respect for tools and equipment.
Complete assignments accurately and on time.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Assume responsibility for own decisions and actions.
In addition, refer to Employability Skills List.

SAFETY

Identify and follow safe lifting techniques.
Identify and follow safety requirements for working around automated machinery.
Ventilate solvent fumes to avoid respiratory problems.
Use care when using solvents to avoid skin rash and eye injury.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Maintain a clean and orderly work area.

EQUIPMENT AND MATERIALS

Blueprints
Job specifications
NC/CNC machine tools
Mounting hardware
Precision measuring instruments
Technical references
Work holding devices
Hoist or lift table
Machinist's tool kit
Dial indicator

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 62.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 62.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
V-TECS Curriculum Guide, Machine Shop, Performance Objectives 18 & 148.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Biological and Physical Sciences:
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Mathematics:
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Physical Development and Health:
- Goal 6-A: Basic safety practices demonstrated during participation in physical activities.
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Clamp dial indicator to tool holder

PERFORMANCE STANDARD Dial indicator must be securely attached to NC/CNC machine and remain attached while in use.

STEPS

1. Read and interpret job specifications, orders or blueprints to determine type of indicator and mounting location.
2. Select dial indicator and necessary attachments.
3. Test dial indicator for proper operation.
   NOTE: Dial indicators are very precise and fragile measuring instruments, and caution must be used in handling them.
4. Change dial indicator point if necessary.
5. Select mounting accessories.
6. Mount accessories to indicator.
7. Mount dial indicator to NC/CNC machine using arbor, chuck, collet, magnetic base or tool holder.
8. Position and secure dial indicator in proper location.
9. Check your work to be sure dial indicator is securely mounted.

KNOWLEDGE

Explain the operating principles and functions of dial indicators.
Identify amount of error allowed in alignment to select the appropriate dial indicator and accessories.
Identify and demonstrate the procedure for mounting dial indicators.
Identify the types and parts of dial indicators.
Identify technical terms associated with dial indicators.
Read and interpret job specifications, orders or blueprints to select appropriate dial indicator and accessories.

ATTITUDES

Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.

ATTITUDES (Cont.)

Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Maintain a clean and orderly work area.
Apply general shop safety practices.
Identify and follow safety requirements for working around automated machinery.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Dial indicator and accessories

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 63.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 63.
Machine Shop, Vocational Instructional Services, Texas A&M University, 1986.
V-TECS Curriculum Guide, Machine Shop, Performance Objectives 18, 109 & 149.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
  Goal 1-A: Recognition, recall, and summarization of material read.
  Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
Mathematics:
  Goal 1-A: Ability to read, write and name numbers in several different ways.
  Goal 1-B: Ability to perform operations with numbers with and without a calculator.
  Goal 1-D: Ordering numbers.
  Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
  Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  Goal 7-C: Application of intervals as estimates.
Physical Development and Health:
  Goal 3-A: Safe and appropriate use of equipment in physical activities.
  Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Change tool holder
PERFORMANCE STANDARD	Tool holder must remain securely mounted in NC/CNC machine during machining operations.

STEPS

1. Select tool and holder assembly to be used.
2. Determine type of tool holding system:
    a. If the tool holder is mounted on the spindle, go to step #3.
    b. If the tool holder is mounted on the turret, go to step #16.
    c. If the tool holder is mounted on the cross slide, go to step #22.

CAUTION: Tools which exceed the manufacturer's length, weight or dimensional specifications may break and damage the machine and/or tool and cause injury to the operator.
Loading or unloading tools while machine is in cycle may result in injury.

IF THE TOOL HOLDER IS MOUNTED ON THE MACHINE SPINDLE, DO THE FOLLOWING:

3. Determine type of drawbar:
    a. If the machine has an automatic drawbar, go to step #4.
    b. If the machine has a manual drawbar, go to step #8.

TO MOUNT THE HOLDER AND TOOL USING AN AUTOMATIC DRAWBAR, FOLLOW THESE STEPS:

4. Remove tool holder from spindle by holding tool holder and pushing tool change button.
   NOTE: NC/CNC machines have a variety of tool mounting systems; follow the instructions in the manufacturer's operating manual to remove and replace the tool holder.
5. Check new tool holder for burrs, chips or dirt and clean or deburr if necessary.
6. Hold tool and holder assembly near spindle opening with one hand and push tool change button with other hand.
7. Insert tool and holder assembly into spindle and release tool change button.

STEPS
(Cont.)

TO MOUNT THE HOLDER AND TOOL USING A MANUAL DRAWBAR, FOLLOW THESE STEPS:

8. Engage spindle brake if necessary.
9. Loosen lock collar using wrench.
10. Remove tool holder from spindle.
11. Check new tool holder for burrs, chips or dirt and clean or deburr if necessary.
12. Place tool and holder assembly in spindle opening.
13. Rotate tool holder assembly in spindle until it seats.
14. Place wrench on slotted collar of spindle and tighten collar on tool holder.
15. Check for tightness.

TO MOUNT THE TOOL HOLDER TO A MACHINE TURRET, FOLLOW THESE STEPS:

16. Loosen locking bolts using wrench while holding tool holder with other hand.
17. Remove tool holder from turret.
18. Check new tool holder for burrs, chips or dirt and clean or deburr if necessary.
19. Place tool holder assembly in turret.
20. Adjust tool holder assembly until it is in proper position.
21. Tighten locking bolts.

TO MOUNT THE TOOL HOLDER TO A MACHINE CROSS SLIDE TOOL POST, FOLLOW THESE STEPS:

22. Loosen locking bolts using wrench while holding tool holder with other hand.
23. Remove tool holder from cross slide tool post.
24. Check new tool holder for burrs, chips or dirt and clean or deburr if necessary.
25. Place tool holder assembly in cross slide tool post.
26. Adjust tool holder assembly to proper position and to center line if necessary.
27. Tighten locking bolts.

KNOWLEDGE

Explain the operating principles and functions of NC/CNC machine tool holding systems.
Identify and demonstrate methods of changing NC/CNC machine tool holders.
Identify the types and parts of NC/CNC machine tool holding systems.
Identify technical terms associated with NC/CNC machine tool holding systems.
Identify the types and parts of NC/CNC machines.
Read and interpret machine manuals to determine procedures for changing NC/CNC machine tool holders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Use care when working with machine tools and machinist's hand tools to avoid injury.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Do not load or unload tools while machine is in cycle.
Do not use tools which exceed the manufacturer's length, weight or dimensional specifications because they may break and damage the machine and cause injury to the operator.

EQUIPMENT AND MATERIALS

NC/CNC machines
Machinist's tool kit
Technical references
Tool holders

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 64.
V-TECS Catalog, Computerized Numerical Control, Performance Objective 64.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 7-C: Application of intervals as estimates.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Change or replace cutting tool

PERFORMANCE STANDARD Cutting tool must be removed and replaced with the desired new tool. Cutting tool must be securely seated in tool holder and reset to zero.

STEPS

1. Inspect cutting tool to identify the type of tool and amount of wear or breakage.
2. Determine type of tool holding system:
   a. If the cutting tool and tool holder must be removed from the NC/CNC machine as one unit, go to step #3.
   b. If a new insert is needed, go to step #9.
   c. If the cutting tool may be replaced without removing the tool holder from the machine, go to step #13.

CAUTION: Loading or unloading tools while machine is in cycle may result in injury.

TO CHANGE THE CUTTING TOOL WHEN THE HOLDER AND TOOL MUST BE REMOVED FROM THE MACHINE AS ONE UNIT, FOLLOW THESE STEPS:

3. Remove tool and holder assembly from machine. Refer to Task 760-X-007-M "Change tool holder" for specific information on changing tool holders.
4. Remove cutting tool from tool holder.
5. Check new cutting tool and tool holder for burrs, chips or dirt and clean or deburr if necessary.
6. Install new cutting tool in holder.

CAUTION: Tools which exceed the manufacturer's length, weight or dimensional specifications may break and damage the machine and/or tool and cause injury to the operator.

NOTE: Preset tools must be set to the correct tool height and length. Consult the manufacturer's manual for more information.

7. Replace tool holder in machine.
8. Reset tool to zero position.

STEPS
(Cont.)

TO CHANGE AN INSERT FOLLOW THESE STEPS:

9. Remove insert from tool holder.
   NOTE: There are a wide variety of tool holders and inserts; consult the manufacturer's tooling manual for specific replacement inserts and procedures.
10. Check tool holder pocket for burrs, chips or dirt and clean or deburr if necessary.
11. Inspect tool holder for damage and replace holder or parts as necessary.
12. Install new insert in holder using manufacturer's tooling manual.
    NOTE: Overtightening the insert in the holder may break the insert, strip the screw or damage the cam.

TO CHANGE THE CUTTING TOOL WITHOUT REMOVING THE TOOL HOLDER FROM THE MACHINE, FOLLOW THESE STEPS:

13. Remove cutting tool from tool holder.
14. Check new cutting tool and tool holder for burrs, chips or dirt and clean or deburr if necessary.
15. Install new cutting tool in holder.

CAUTION: Tools which exceed the manufacturer's length, weight or dimensional specifications may break and damage the machine and/or tool and cause injury to the operator.

NOTE: Preset tools must be set to the correct tool height and length. Consult the manufacturer's manual for more information.

16. Reset tool to zero position.

KNOWLEDGE

Identify types of cutting tools, holders and inserts.
Identify and select insert types and grades.
Describe types and causes of tool wear.
Identify types of cutting tool materials.
Identify factors affecting tool geometry.
Identify material specifications.
Identify amount of error allowed in alignment of tools.
Read and interpret blueprint or job specifications.
Define technical terms associated with tooling, tool geometry, cutting tool materials and cutting tool holders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Read and interpret machine manuals to determine operating procedures.
Use Machinery's Handbook or other technical references to determine cutting tool data.

ATTITUDES	Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury. Care must be taken when handling cutting tools to protect the operator from cuts. Do not load or unload tools while machine is in cycle. Do not use tools which exceed the manufacturer's length, weight or dimensional specifications because they may break, damage the machine and cause injury to the operator.
EQUIPMENT AND MATERIALS	NC/CNC machine Job specifications, orders or blueprints Machinist's tool kit Cutting tools Cutting tool holders Inserts Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 65. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 65. New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-I: Difference between efficient and inefficient movements in complex physical activities.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Adjust tool offset manually
PERFORMANCE STANDARD	The offset adjustment must move the cutting tool amount needed to compensate for tool wear, finish cuts and tool usage. Measurement of finished workpiece must meet standards set by blueprints, job specifications or orders.
STEPS	1. Read and interpret job specifications, orders or blueprints to determine tolerance specifications. 2. Measure workpiece to determine dimensional deviation from blueprint: a. Clean and deburr workpiece. b. Select inspection tools. c. Calibrate inspection tools. d. Inspect workpiece. 3. Determine cutting tool responsible for inaccuracy. 4. Identify tool offset number for cutting tool. 5. Enter amount of tool offset (in either diameter or radius) into tool tables. 6. Run trial workpiece. 7. Inspect trial workpiece: a. Clean and deburr workpiece. b. Select inspection tools. c. Calibrate inspection tools. d. Inspect workpiece. 8. Adjust machine if workpiece does not meet tolerance specifications.
KNOWLEDGE	Identify, select and use formulas to calculate machining dimensions. Explain the operating principles and functions of cutting tool offset. Identify amount of error allowed in tolerance specifications. Identify and demonstrate methods of entering tool offset. Define technical terms associated with tool offset. Identify, call up and enter tool offset information into tool schedule or table. Read and interpret job specifications, orders or blueprints. Identify, select and use formulas and tables to perform machining calculations.

KNOWLEDGE (Cont.)	Use Machinery's Handbook or other technical references to determine machining data. Read and interpret machine manuals to determine operating procedures. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury. Care must be taken when handling cutting tools to protect the operator from cuts.
EQUIPMENT AND MATERIALS	NC/CNC machine Job specifications, orders or blueprints Machinist's tool kit Precision measuring instruments Technical references Tool offset table Cutting tools Tool holders Cutting tool sequence numbers
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 66. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 66. New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Interpret operator related messages on screen

PERFORMANCE STANDARD Operator advisory message on display screen must result in defined procedures for maintaining programmed machining operations and result in acceptable quality workpiece as specified on blueprint.

STEPS

1. View display screen during program dry run.
2. Observe operator messages in specific sequence of operations.
   NOTE: NC/CNC machines have a variety of display screens, status lights and other operator information. Consult the manual for your machine to identify specific operator messages and responses to the messages.
3. Follow procedures outlined by machine manual and/or programmer guide for executing commands when message appears during production of workpiece.
   a. React to message by performing the desired operator-intervention task as specified by the message code and program instructions.
   b. React to message by immediately modifying the machining conditions using manual data input and/or system override controls.
   c. React to message by monitoring machining conditions and modifying when program allows.

KNOWLEDGE

Explain the purpose of various operator messages.
Identify and demonstrate reactions to operator messages.
Define technical terms associated with operator messages.
Identify types, controls and operation of NC/CNC machines.
Identify G- and M-code operator messages and control panel displays.
Identify operator-intervention tasks initiated by programmed operator messages.
Read and interpret machine manuals to identify operator messages and to determine operating procedures.
Read and interpret job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.

EQUIPMENT AND MATERIALS

NC/CNC machine
Technical references
Display screen
Machinist's tool kit

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 67.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 67.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-C: Inferences from spoken messages and nonverbal cues.
- Goal 2-F: Effective and appropriate responses.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-B: Ability to develop and maintain a focus with a clear thesis, a main idea, theme or unifying event.
- Goal 3-C: Use of specific information or reasons to support and elaborate the main point.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Control spindle speed override
PERFORMANCE STANDARD	Spindle speed must change to desired revolutions per minute.

STEPS

1. Determine amount of increase or decrease of spindle speed RPM to maintain optimum safety conditions, maximum production, quality parts and maximum tool life.
2. Set spindle RPM control on control board to position for increase or decrease.
   NOTE: NC/CNC machine control boards vary. Consult the operator's manual for your machine to identify the controls and procedures necessary to override the spindle speed.
3. Set desired spindle speed using appropriate controls.
4. Observe display panel to verify spindle speed setting.
5. Run trial workpiece.
6. Inspect trial workpiece to verify quality:
   a. Clean and deburr workpiece.
   b. Select inspection tools.
   c. Calibrate inspection tools.
   d. Inspect workpiece.
7. Adjust spindle speed if necessary.
8. Repeat steps 1-7 for all tools.

KNOWLEDGE

Read and interpret job specifications, orders or blueprints to determine workpiece material and machining data.
Use Machinery's Handbook or other technical references to determine machining data.
Identify, select and use formulas to calculate spindle speed.
Identify material specifications.
Define technical terms associated with spindle speeds.
Identify and demonstrate the procedure for calculating and setting NC/CNC machine spindle speeds.
Read and interpret machine manuals to determine procedures for setting spindle speeds.
Identify, select and use formulas and tables to perform machining calculations.
Identify, select and use precision measuring instruments to inspect workpiece dimensions.

KNOWLEDGE (Cont.)

Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Follow written and oral directions.
Display pride in workmanship.
Focus attention to details.
Work without the need for close supervision.
Display respect for tools, equipment and machines.
Complete assignments accurately and on time.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Assume responsibility for own decisions and actions.
Work effectively with people of different personalities.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Use care when machining the workpiece so that the tool does not break due to high speeds or by running into the workpiece or machine.

EQUIPMENT AND MATERIALS

NC/CNC machines
Technical references
Job specifications, orders or blueprints
Machinist's tool kit

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 68.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 68.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Control feedrate override

PERFORMANCE STANDARD Control must indicate feedrate override mode.

STEPS

1. Determine amount of feedrate increase or decrease for each tool to maintain optimum safety conditions, maximum production, quality parts and maximum tool life.
2. Verify tool number/location at the control board.
3. Set feedrate override control on control board to position for increase or decrease.
   NOTE: NC/CNC machine control boards vary; consult the operator's manual for your machine to identify the controls and procedures necessary to override the feedrate.
4. Set desired feedrate using appropriate controls.
5. Observe display panel to verify feedrate setting.
6. Run trial workpiece.

CAUTION: Use care when machining the trial workpiece so that the tool does not break due to high feedrates or by running into the workpiece or machine.

7. Inspect trial workpiece to verify quality:
   a. Clean and deburr workpiece.
   b. Select inspection tools.
   c. Calibrate inspection tools.
   d. Inspect workpiece.
8. Adjust feedrate if necessary.
9. Repeat steps 1-8 for all tools.
10. Cancel feedrate override at completion of override operation.

KNOWLEDGE

Read and interpret job specifications, orders or blueprints to determine workpiece material, specifications and machining data.
Use Machinery's Handbook or other technical references to determine machining data.
Identify, select and use formulas to calculate feed rate.
Identify material specifications.
Define technical terms associated with feedrates.
Identify and demonstrate the procedure for calculating and setting NC/CNC machine feedrates.

KNOWLEDGE (Cont.)

Read and interpret machine manuals to determine procedures for setting feedrates.
Identify, select and use formulas to perform machining calculations.
Use Machinery's Handbook or other technical references to determine machining data.
Identify, select and use precision measuring instruments to inspect workpiece dimensions.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Follow written and oral directions.
Display pride in workmanship.
Focus attention to details.
Work without the need for close supervision.
Display respect for tools, equipment and machines.
Complete assignments accurately and on time.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Assume responsibility for own decisions and actions.
Work effectively with people of different personalities.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Use care when machining the workpiece that the tool does not break due to high feeds or by running into the workpiece or machine.

EQUIPMENT AND MATERIALS

NC/CNC machines
Technical references
Job specifications, orders or blueprints
Machinist's tool kit
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 69.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 69.
New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-B: Questioning and predicting giving rationales for each prior to, during, and after reading.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Activate automatic cycle mode

PERFORMANCE STANDARD Machine must run entire program or block-by-block execution of program without interruption or operator intervention.

STEPS

1. Check setup to verify that:
   - a. Work holding device is securely attached and aligned.
   - b. Part is installed in work holding device.
   - c. Correct cutting tools are preset and installed.
   - d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Perform zeroing sequence.
4. Verify program number.
5. Search for and set safe start-up location.
6. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
7. Activate automatic cycle mode control.
8. Observe control display to verify that automatic control mode is activated.

KNOWLEDGE

Explain the operating principles and functions of the automatic cycle mode.
Identify and demonstrate the procedure to activate the automatic cycle mode.
Define technical terms associated with automatic cycle mode.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.
Read and interpret blueprints.
Read and interpret job specifications and orders.
Read and interpret machine manuals to determine operating procedures.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Care must be taken when handling cutting tools to protect the operator from cuts.

EQUIPMENT AND MATERIALS

Blueprints
Job specifications
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 70.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 70.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-A: Basic safety practices demonstrated during participation in physical activities.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-O: The nature of force.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Interrupt automatic cycle mode manually

PERFORMANCE STANDARD NC/CNC machine automatic cycle mode must be interrupted and machine must stop when stop control is activated.

STEPS

1. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Perform zeroing sequence.
4. Verify program number.
5. Search for and set safe start up location.
6. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
7. Activate automatic cycle mode control and start machining workpiece.
8. Determine method necessary to interrupt the auto cycle mode.
   NOTE: NC/CNC machines and machining processes vary. Consult the manufacturer's operating manual to determine the specific method to use to interrupt the automatic cycle mode.
9. Switch from automatic cycle mode to single block mode, if necessary.
10. Activate feed hold during machining, if necessary.
11. Activate cycle stop control during machining, if necessary.
12. Observe machine to verify interruption of automatic cycle.
13. Observe control panel for indicator light status.

KNOWLEDGE

Explain the operating principles and functions of the automatic cycle interrupt procedure.

Identify and demonstrate the procedure for interrupting the automatic cycle.

Define technical terms associated with interrupting the automatic cycle.

KNOWLEDGE (Cont.)

Read and interpret blueprints.
Read and interpret job specifications and orders.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 71.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 71.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Set manual mode control

PERFORMANCE STANDARD Control display must indicate that manual mode is active while machine is in manual control.

STEPS

1. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Clear entry on computer or control.
4. Select manual mode.

CAUTION: NC/CNC machines vary; some may be damaged, or the program lost if you switch to manual mode while the machine is running a program. Consult the manufacturer's operating manual for the proper procedure, codes and program format.

5. Observe machine and control panel to verify entry of manual mode.

KNOWLEDGE

Explain the operating principles and functions of manual control mode.
Identify and demonstrate the procedure for setting manual control mode.
Define technical terms associated with manual control mode.
Read and interpret blueprints.
Read and interpret job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.

ATTITUDES (Cont.)	Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Blueprints Job specifications NC/CNC machines Machinist's tool kit Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 72. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 72. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Social Sciences: Goal 5-I: Roles of the individual in the world of work. Goal 5-J: Relationships between competence and potential. Biological and Physical Sciences: Goal 1-P: Perception as our way of interpreting the world. Goal 1-Q: Time and space as dimensions which separate things and events. Goal 4-E: Measurement.

ILLINIOS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 1-A: Ability to read, write and name numbers in several different ways.

Goal 1-B: Ability to perform operations with numbers with and without a calculator.

Goal 1-D: Ordering numbers.

Goal 1-E: Application of properties of numbers and operations.

Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

Goal 2-A: Interpretation of ratios.

Goal 2-C: Application of ratios and proportions to real-life situations.

Goal 3-A: Measurement in various contexts using appropriate units.

Goal 3-B: Estimation of measurements.

Goal 3-D: Conversion of units within one system and from one system to another.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.

Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.

Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.

Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Select cycle modifiers

PERFORMANCE STANDARD

Program operating sequence must reflect all edit entries (cycle modifiers). Modified code must correct machining process to produce workpiece which conforms to blueprint specifications.

STEPS

1. Inspect workpiece to identify dimensions which are out of tolerance.
   a. Clean and deburr workpiece.
   b. Select inspection tools.
   c. Calibrate inspection tools.
   d. Inspect workpiece.
2. Identify program code which will require modification to produce workpiece which conforms to blueprint specifications.
3. Edit program code by selecting cycle modifiers which will produce workpiece which conforms to blueprint specifications.
4. Produce new tape or program, if necessary.
5. Dry run the modified program to verify the cycle modifier entry at the control panel.
6. Correct any problems.
7. Run a trial workpiece.
8. Inspect workpiece according to shop inspection standards:
   a. Clean and deburr workpiece.
   b. Select inspection tools.
   c. Calibrate inspection tools.
   d. Inspect workpiece.
9. Repeat steps 2-8 if workpiece does not meet blueprint specifications.

KNOWLEDGE

Identify, select and use formulas to calculate depth of cut.
Identify, select and use formulas to calculate feedrate.
Identify, select and use formulas to calculate machining dimensions.
Explain the functions of cycle modifiers.
Identify and demonstrate the procedure for selecting cycle modifiers.
Define technical terms associated with cycle modifiers.

KNOWLEDGE (Cont.)

Read and interpret blueprints, job specifications and orders.
Read and interpret machine manuals to determine operating procedures and cycle modifiers.
Identify, select and use formulas and tables to perform machining calculations.
Use Machinery's Handbook or other technical references to determine machining data.
Identify, select and use precision measuring instruments to inspect workpiece dimensions.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work cooperatively as a member of a team.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 73.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 73.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.
- Goal 4-A: Clear and expressive speaking.
- Goal 4-E: Use of language for a variety of purposes.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 5-C: Application of concepts of congruence and similarity.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-A: Basic safety practices demonstrated during participation in physical activities.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Select manual feed/jog mode
PERFORMANCE STANDARD	Control display must indicate position and distance of axes movement by manual feed/jog mode.
STEPS	1. Stop program. 2. Clear entries from control. 3. Turn selector switch to position that allows manual/jog movement of axis. NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for manual feed/jog switch settings. 4. Set manual feedrate override switch to axis travel rate desired. 5. Check work area for objects in axis travel path, and move or remove objects if necessary. 6. Activate desired axis direction control. 7. Release axis control when desired location is reached. 8. Make necessary adjustments to feedrate override. NOTE: Some NC/CNC machines are equipped with a manual jog handwheel to allow repetitive incremental moves. The number of increments is selected from the handwheel dial. Consult the manufacturer's operating manual for more information.
KNOWLEDGE	Read and interpret blueprints, job specifications and orders. Read and interpret machine manuals to determine manual feed/jog mode operating procedures. Identify and demonstrate the procedure for operating NC/CNC machines in manual feed/jog mode. Explain the operating principles and functions of manual feed/jog mode. Define technical terms associated with manual feed/jog mode. Identify types, controls and operation of manual feed/jog mode. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.

ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 74. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 74. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses. Goal 4-A: Clear and expressive speaking. Goal 4-E: Use of language for a variety of purposes. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Social Sciences: Goal 5-I: Roles of the individual in the world of work. Goal 5-J: Relationships between competence and potential.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Adjust cutter compensation
PERFORMANCE STANDARD	Programmed center path of cutting tool must allow for the difference between actual and programmed cutter diameter. Program will produce workpiece to meet blueprint specifications.
STEPS	1. Determine whether cutter path lies to right or left of workpiece. 2. Measure cutter and calculate the cutter diameter compensation necessary. 3. Modify programmed center-line location of cutter by entering cutter compensation data. NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for specific cutter compensation code and method used to modify program. 4. Change feedrate for cutter compensation if necessary. 5. Cancel cutter compensation when program is finished.
KNOWLEDGE	Identify, select and use formulas to calculate machining dimensions. Explain the functions of cutter compensation. Identify amount of error allowed in cutter compensation calculations. Identify and demonstrate the procedure used to modify cutter compensation. Define technical terms associated with cutter compensation. Read and interpret blueprints, job specifications and orders. Read and interpret machine manuals to determine operating procedures. Identify, select and use formulas and tables to perform machining calculations. Use Machinery's Handbook or other technical references to determine machining data. Identify, select and use precision measuring instruments to inspect cutter and workpiece dimensions. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.

ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury. Care must be taken when handling cutting tools to protect the operator from cuts.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 75. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 75. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 4-A: Clear and expressive speaking. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Social Sciences: Goal 5-I: Roles of the individual in the world of work. Goal 5-J: Relationships between competence and potential.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 5-C: Application of concepts of congruence and similarity.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Edit program
PERFORMANCE STANDARD	Edited program must produce parts which meet blueprint specifications.
STEPS	1. Inspect workpiece to identify dimensions which are out of tolerance. a. Clean and deburr workpiece. b. Select inspection tools. c. Calibrate inspection tools. d. Inspect workpiece. 2. Identify program code which will require modification (editing) to produce workpiece which conforms to blueprint specifications. 3. Edit program code to produce workpiece which conforms to blueprint specifications. 4. Produce new tape or program, if necessary. 5. Dry run the edited program to verify the edit entry at the control panel. 6. Correct any problems. 7. Run a trial workpiece. 8. Inspect workpiece according to shop inspection standards: a. Clean and deburr workpiece. b. Select inspection tools. c. Calibrate inspection tools. d. Inspect workpiece. 9. Repeat steps 2-8 if workpiece does not meet blueprint specifications.
KNOWLEDGE	Identify, select and use formulas to calculate depth of cut. Identify, select and use formulas to calculate feedrate. Identify, select and use formulas to calculate machining dimensions. Explain the functions of editing the program. Identify and demonstrate the procedure for editing the program. Define technical terms associated with program editing. Read and interpret blueprints, job specifications and orders. Read and interpret machine manuals to determine operating procedures.

KNOWLEDGE (Cont.)	Identify, select and use formulas and tables to perform machining calculations. Use Machinery's Handbook or other technical references to determine machining data. Identify, select and use precision measuring instruments to inspect workpiece dimensions. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work cooperatively as a member of a team. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 76. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 76. Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.
- Goal 4-A: Clear and expressive speaking.
- Goal 4-E: Use of language for a variety of purposes.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 5-C: Application of concepts of congruence and similarity.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-A: Basic safety practices demonstrated during participation in physical activities.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Run segment of program
PERFORMANCE STANDARD	Operator must search for specific safe start up block, return to prior block, or run program forward to next machining sequence and run a segment (block) of the program.
STEPS	1. Search program for start of specific machining block (program segment). NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for control board commands to locate specific program segments. 2. Locate block required. 3. Activate block mode. NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for the specific procedure to activate the block mode. 4. Run the required segment of the program.
KNOWLEDGE	Explain the reasons to run a segment of a program. Identify and demonstrate the procedure used to run a segment of a program. Define technical terms associated with running a segment of a program. Read and interpret blueprints, job specifications and orders. Read and interpret machine manuals to determine operating procedures. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, *Computerized Numerical Control*, Performance Objective 77.
V-TECS Curriculum Guide, *Computerized Numerical Control*, Performance Objective 77.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Perform sequence search
PERFORMANCE STANDARD	Operator must locate specific program sequence (block).
STEPS	1. Clear old program from machine memory. 2. Enter and call up necessary program. 3. Search program for start of specific machining block (program segment). NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for control board commands to locate specific program segments. 4. Locate segment required.
KNOWLEDGE	Explain the reasons for performing a sequence search. Identify and demonstrate the procedure for performing a sequence search. Define technical terms associated with sequence searches. Read and interpret blueprints, job specifications and orders. Read and interpret machine manuals to determine operating procedures. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 78.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 78.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Interpret status lights

PERFORMANCE STANDARD Operator must maintain continuous operation of program and NC/CNC machine as a result of interpreting status lights, indicators and displays on control unit.

STEPS

1. Read and interpret blueprint or job specifications to determine workpiece dimensions and specifications.
2. Mount workpiece in fixture or work holding device.
3. Mount tools.
4. Set zero point.
5. Load program.
6. Dry run machine.
7. Determine setup problem and make necessary adjustments.
8. Run trial workpiece.
9. Inspect first piece:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
10. Verify accuracy of setup.
11. Adjust setup or program if necessary, or notify supervisor of machine malfunctions.
12. Run job.
13. Observe NC/CNC machine control panel status lights, indicators and displays while job is running.
14. Follow procedures outlined by machine manual and/or programmer guide/job specifications for executing commands when light, indicator or display indicates a problem during production of workpiece.
    a. Apply corrective measures for machine malfunction or notify service personnel.
    b. Enter system commands to deactivate light, indicator or display.
    c. Follow procedures to maintain NC/CNC machine and continue machining program.
15. Follow company policy and correct problems, or notify supervisor of machine malfunctions or discrepancies in parts while running job.

KNOWLEDGE

Read and interpret blueprints, job specifications and orders.
Inspect parts according to shop inspection standards.
Identify problems with numerical control/computer numerical control machine, program, cutting tools and setup.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and demonstrate the procedures for using the NC/CNC machine controls.
Explain the functions and meaning NC/CNC machine status lights, indicators and display messages.
Identify temperature warning, servo fault, data error, program changes, power supply, diagnostic and other types of status lights, indicators and display messages.
Explain the procedures, corrective measures, system commands or other necessary methods to react to status lights, indicators or display messages.
Identify, select and use precision measuring instruments to inspect workpiece dimensions.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Maintain a clean and orderly work area.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 67, 79.

V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 67,79.

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-B: Application of symmetry and transformations.
- Goal 5-C: Application of concepts of congruence and similarity.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Change spindle speed

PERFORMANCE STANDARD Spindle speed must be adjusted for maximum output, and changes must be indicated on control panel.

STEPS

1. Determine amount of feed and spindle RPM increase or decrease for each operation.
2. Enter new spindle speed value into machine control:
    a. Set spindle RPM control to increase or decrease.
    b. Engage spindle RPM control until desired RPM is obtained.
    c. Observe CRT or control panel indicators for verification of new speeds.

    NOTE: NC/CNC machines vary consult the manufacturer's operating manual for specific procedures for changing the spindle speed.

KNOWLEDGE

Read and interpret blueprints, job specifications and orders to determine workpiece material, specifications and machining data.
Use Machinery's Handbook or other technical references to determine machining data.
Identify, select and use formulas to calculate spindle speed.
Identify material specifications.
Define technical terms associated with spindle speeds.
Identify, select and use formulas and tables to perform machining calculations.
Read and interpret machine manuals to determine operating procedures.
Identify and demonstrate the procedure for setting spindle speeds.
Explain the relation of spindle speed to machining time.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Use care when machining the workpiece that the tool does not break due to high speeds.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objectives 7, 51 & 80.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objectives 7, 51 & 80.
V-TECS Catalog, Machinist, Performance Objective 60.
V-TECS Curriculum Guide, Machine Shop, Performance Objective 90.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
    Goal 1-A: Recognition, recall, and summarization of material read.
    Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
    Goal 2-A: Meaning of spoken messages.
    Goal 2-F: Effective and appropriate responses.
    Goal 4-A: Clear and expressive speaking.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Initiate program restart from zero

PERFORMANCE STANDARD Operator must return to original zero coordinates and start up block in program and restart the program to complete the workpiece according to specifications.

STEPS

1. Search program for initial start-up block.
   NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for control board commands to locate specific program segments.
2. Locate start block in program.
3. Return to original zero coordinates.
4. Reset all functions to original settings if necessary.
5. Restart the program and complete the workpiece to specifications.

KNOWLEDGE

Explain the reasons for restarting the program.
Identify and demonstrate the procedure for restarting the program from zero.
Define technical terms associated with restarting the program from zero.
Read and interpret blueprints, job specifications and orders.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objectives 71 & 81.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 71 & 81.
Machine Shop, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Interrupt cycle
PERFORMANCE STANDARD	NC/CNC machine automatic cycle mode must be interrupted and machine must stop when cycle stop control is activated.
STEPS	NOTE: Analysis of this task shows that it is the same as Task 760-X-014-M "Interrupt automatic cycle mode manually." Refer to that task analysis for more information.
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Check cutting fluids

PERFORMANCE STANDARD Cutting fluid level must meet standards recommended by NC/CNC machine tool manufacturer and indicator must show level of cutting fluids and/or mist coolant.

STEPS

1. Check sight gauge and/or indicator gauge on control panel to determine coolant level.
   NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual to identify and locate the coolant level sight gauge and/or indicator gauge.
2. Determine the physical condition of the cutting fluid/coolant.
   NOTE: Cutting fluids/coolants vary. Consult the machine and job specifications and your supervisor to determine the appropriate coolant.

IF THE CUTTING FLUID/COOLANT IS LOW, COMPLETE STEPS 4-6.

IF THE CUTTING FLUID/COOLANT IS IN NEED OF CHANGE, COMPLETE STEPS 3-6.

3. Drain and flush coolant tank following all procedures for disposing of hazardous waste materials.
4. Prepare coolant mixture following manufacturer's recommendation for ratio of coolant and water or obtain proper cutting fluid.
5. Add cutting fluid/coolant to tank to level recommended by manufacturer.
6. Check sight gauge and/or indicator gauge on control panel to verify coolant level.

KNOWLEDGE

Identify, select and use formulas to calculate coolant mixture ratios.
Explain the operating principles of cutting fluid, coolant and mist coolant systems.
Explain the functions of cutting fluids/coolants.
Identify and demonstrate the procedure for mixing, adding and changing coolant.
Identify and select cutting fluids/coolants.
Read and interpret blueprints, job specifications and orders.
Read and interpret machine manuals to determine cutting fluid/coolant types and procedures to change cutting fluid/coolant.

KNOWLEDGE (Cont.)	Explain the hazardous nature of cutting fluids/coolants. Explain the disposal procedures for hazardous materials. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work cooperatively as a member of a team. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. Display respect for the environment. Follow directions for the disposal of hazardous materials. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury. Care must be taken when handling cutting fluids and coolants.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Cutting fluid Coolant Water Waste disposal containers
SOURCE OF ANALYSIS	V-TECS Catalog, *Computerized Numerical Control*, Performance Objective 83. V-TECS Curriculum Guide, *Computerized Numerical Control*, Performance Objective 83. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 2-C: Relationships between the natural and technological world.
- Goal 2-H: Environmental issues in light of scientific and technological knowledge and ethical principles.

Physical Development and Health:
- Goal 2-R: Signs and symptoms indicating the need for professional medical attention.
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 3-I: Appropriate emergency agencies and phone numbers.
- Goal 3-K: Hazardous environmental substances and the efforts to control them.
- Goal 3-L: Effects of human relationships with the environment on lifestyles in the present and in the future.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Check surface finish
PERFORMANCE STANDARD	Surface finish of workpiece must measure within tolerances specified on blueprint, job specifications or work order.
STEPS	1. Read and interpret job specifications, orders or blueprints to determine surface finish standards. 2. Clean and deburr workpiece. 3. Select inspection tools. a. Surface finish gauge. b. Profilometer. 4. Compare workpiece surface with surface finish gauge to determine surface quality of workpiece. 5. Calibrate profilometer, if necessary. 6. Inspect workpiece using profilometer to determine if workpiece surface finish is within specified tolerances. 7. Accept or reject workpiece according to shop standards.
KNOWLEDGE	Identify surface texture symbols. Explain the difference between surface texture and surface integrity. Define technical terms associated with surface finish. Identify and demonstrate methods of inspecting surface finish. Explain the operating principles and functions of surface finish inspection tools. Read and interpret blueprints, job specifications and orders. Use Machinery's Handbook or other technical references to determine surface finish data. Identify, select and use precision measuring instruments to inspect workpiece surface finish. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments
Surface finish gauge
Profilometer

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 84.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 84.
Machine Shop, Vocational Instructional Services, Texas A&M University, 1986.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 5-C: Application of concepts of congruence and similarity.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Check cut dimension

PERFORMANCE STANDARD Workpiece must meet blueprint or job specifications for dimensional tolerance and surface finish.

STEPS

1. Read and interpret blueprint or job specifications to determine inspection tools and techniques, dimensions and tolerance necessary.
2. Clean and deburr workpiece.
3. Consult Machinery's Handbook or other technical reference to determine inspection technique, data, formulas, gages, or other necessary inspection information.
4. Perform any calculations necessary to complete the inspection process.
5. Inspect workpiece for dimensional accuracy:
   a. Select inspection tools.
   b. Calibrate inspection tools.
   c. Inspect workpiece dimensions.
   d. Compare measurements to blueprint or job specifications.
   e. Verify workpiece dimension as within or without specified tolerance.
   f. Approve or reject workpiece according to shop inspection standards.

KNOWLEDGE

Read and interpret blueprint or job specifications to identify dimensions and tolerance requirements.
Identify and demonstrate the methods of checking angular dimensions.
Identify and demonstrate the methods of checking dimensions.
Identify and demonstrate the methods of checking radii.
Identify, select, and use formulas to calculate machined dimensions.
Identify tolerance allowed in machined dimensions.
Use calculator to perform angular, linear, radii, taper and other necessary calculations.
Use Machinery's Handbook or other technical references to determine inspection data, formulas, gages or inspection techniques.

KNOWLEDGE (Cont.)

Identify, select and use formulas and tables to perform inspection calculations.
Define technical terms associated with inspection tools and techniques.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work cooperatively as a member of a team.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Use care when handling and measuring the workpiece not to get cut on sharp edges or burrs.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments
Workpiece

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 85.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 85.
V-TECS Catalog, Machinist, Performance Objectives 2-7, 9, 12-26.
V-TECS Curriculum Guide, Machine Shop, Performance Objectives 2-7, 9, 12-26.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  - Goal 2-A: Meaning of spoken messages.
- Mathematics:
  - Goal 1-A: Ability to read, write and name numbers in several different ways.
  - Goal 1-B: Ability to perform operations with numbers with and without a calculator.
  - Goal 1-D: Ordering numbers.
  - Goal 1-E: Application of properties of numbers and operations.
  - Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
  - Goal 3-A: Measurement in various contexts using appropriate units.
  - Goal 3-B: Estimation of measurements.
  - Goal 3-C: Relating lengths, areas, and volumes in common geometric figures.
  - Goal 3-D: Conversion of units within one system and from one system to another.
  - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  - Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
  - Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
  - Goal 7-C: Application of intervals as estimates.
  - Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Social Sciences:
  - Goal 5-I: Roles of the individual in the world of work.
  - Goal 5-J: Relationships between competence and potential.
- Biological and Physical Sciences:
  - Goal 1-P: Perception as our way of interpreting the world.
  - Goal 1-Q: Time and space as dimensions which separate things and events.
  - Goal 4-E: Measurement.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Index turret

PERFORMANCE STANDARD Turret must be indexed to required position.

STEPS

1. Select tool station number on turret.
2. Set control on control panel to desired turret station number.
   NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for turret index controls.
3. Check turret location to ensure that when the turret is indexed, the tools will not run into the machine, fixture or other obstruction.

CAUTION: Index turret only when in an interference-free area. Failure to follow this precaution could result in damage to tooling, workpiece, NC/CNC machine, and cause injury to the operator.

4. Activate control to index turret.
5. Verify new turret location.
6. Repeat for each turret tool station necessary.

KNOWLEDGE

Explain the functions of indexing the turret.
Identify the types and parts of turrets.
Define technical terms associated with indexing turrets.
Read and interpret blueprints, job specifications and orders.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.
Index turrets only when in an interference free area. Failure to follow this precaution could result in damage to tooling, the workpiece, NC/CNC machine, and cause injury to the operator.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 86.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Differentiate between machine controls

PERFORMANCE STANDARD Operators must transfer control operating skills to similar machine tools to perform machining processes.

STEPS

1. Read and interpret machine manuals to identify operating controls.
2. Read and interpret job specifications, orders or blueprints to identify procedure to be initiated.
3. Review lights, digital indicators, buttons, dials, switches, keyboard and other controls on previously used NC/CNC machines.
4. Review function of controls with procedure to be initiated.
5. Identify specific controls and operations:
   a. Identify lights, digital indicators, buttons, dials, switches, keyboard and other controls on new NC/CNC machines.
   b. Match function of control to procedure to be followed.
6. Contact supervisor for additional information.

KNOWLEDGE

Read and interpret machine manuals to identify operating controls and to determine operating procedures.
Explain the operating principles and functions of various NC/CNC machines.
Explain the operating principles and functions of various NC/CNC machine controls.
Identify the types and parts of various NC/CNC machines.
Define technical terms associated with NC/CNC machines and their controls.
Read and interpret blueprints, job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES	Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Identify and follow safety requirements for working around automated machinery.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 87. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 87. New Machining Technology, Vocational Instructional Services, Texas A&M University, 1986. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators. Social Sciences: Goal 5-I: Roles of the individual in the world of work. Goal 5-J: Relationships between competence and potential. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Set cycle dwell

PERFORMANCE STANDARD Machine tooling must remain motionless in cut for specified dwell time.

STEPS

1. Check setup to verify that:
    a. Work holding device is securely attached and aligned.
    b. Part is installed in work holding device.
    c. Correct cutting tools are preset and installed.
    d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Perform zeroing sequence.
4. Verify program number.
5. Search for and set safe start up location.
6. Determine needed delay of cutter motion or delayed program time.
7. Enter sequence number for program block.
8. Enter dwell time.
    NOTE: NC/CNC machines vary. Consult the manufacturer's operating manual for specific procedures and units to use when setting the dwell time.
9. Observe control to verify entry of cycle dwell time.
10. Start program and run workpiece.
11. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
12. Adjust machine or program if necessary.

KNOWLEDGE

Read and interpret machine manuals to determine operating procedures.
Explain the operating principles and functions of cycle dwell time.
Identify and demonstrate the procedure for setting the cycle dwell time.
Define technical terms associated with dwell time.
Read and interpret blueprints, job specifications and orders.

KNOWLEDGE (Cont.)

Read and interpret machine manuals to determine procedures for setting the cycle dwell time.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 88.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 88.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Modify manual data input program
PERFORMANCE STANDARD	Analysis of this task has shown that it is the same as Task 760-X-016-M "Select cycle modifiers." Refer to that task for the task analysis.
STEPS	
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Adjust depth of cut

PERFORMANCE STANDARD Depth of cut on workpiece must produce a part which meets the tolerance requirements and specifications called for on the job specifications, orders or blueprint.

STEPS

1. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Perform zeroing sequence.
4. Verify program number.
5. Search for and set safe start-up location.
6. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
7. Activate automatic cycle mode control.
8. Run trial workpiece.
9. Inspect part according to shop inspection standards:
   a. Clean and deburr workpiece.
   b. Select inspection tools.
   c. Calibrate inspection tools.
   d. Inspect workpiece.
   e. Accept or reject workpiece according to shop inspection standards.
10. Compare depth of cut on workpiece to job specifications.
11. Adjust depth of cut by:
    a. Moving table.
    b. Moving tool.
    c. Changing axis depth on program.
12. Run trial workpiece.
13. Repeat steps 9-12 until job specifications are met.

KNOWLEDGE

Identify, select and use formulas to calculate depth of cut.
Identify, select and use formulas to calculate machining dimensions.
Identify and demonstrate the procedure for setting the depth of cut.

KNOWLEDGE (Cont.)

Define technical terms associated with adjusting the depth of cut.
Read and interpret blueprints, job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 90.
V-TECS Curriculum Guide, Machine Shop, Performance Objectives 13 & 30.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
    Goal 1-A: Recognition, recall, and summarization of material read.
    Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
Social Sciences:
    Goal 5-J: Relationships between competence and potential.
    Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-B: Estimation of present and future values from graphs or numerical information.
- Goal 7-C: Application of intervals as estimates.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Reset tool cycle time

PERFORMANCE STANDARD

When tool number and tool location are entered in NC/CNC machine computer processor, C.R.T. screen must provide tool cycle time with tool number and tool pocket location number.

NOTE: Programming a tool with no time remaining will result in the message "program error."

STEPS

1. Measure tool lifetime as specified by manufacturer's tooling manual.
2. Reset tool time for each new tool or each time a tool is sharpened or changed.
3. Enter tool number or tool pocket location for tool cycle time.
   NOTE: NC/CNC machine controls and programs vary. Consult the manufacturer's operating manual for information on how to enter tool cycle time.
4. Enter predicted tool lifetime as specified by manufacturer's tooling manual.
5. Continue process for each tool for which tool cycle time is being reset.

KNOWLEDGE

Explain how and why tool cycle time is used.
Explain how feed motion affects the tool cycle time.
Define technical terms associated with tool cycle time.
Identify and demonstrate the procedure for setting the tool cycle time.
Use Machinery's Handbook or other technical references to determine machining data.
Read and interpret machine manuals and tooling manuals to determine operating procedures and tooling information.
Read and interpret blueprints, job specifications and orders.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.

ATTITUDES (Cont.)

Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references

SOURCE OF ANALYSIS

V-TECS Catalog, Computerized Numerical Control, Performance Objective 91.
V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 91.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Execute emergency stop

PERFORMANCE STANDARD NC/CNC machine automatic cycle mode must be interrupted and all controls must remain inactive while emergency stop control is activated.

STEPS

1. Check setup to verify that:
    a. Work holding device is securely attached and aligned.
    b. Part is installed in work holding device.
    c. Correct cutting tools are preset and installed.
    d. Correct program is loaded into memory.
2. Perform control on sequence.
3. Perform zeroing sequence.
4. Verify program number.
5. Search for and set safe start-up location.
6. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
7. Activate automatic cycle mode control and start machining workpiece.
8. Determine method necessary to execute the emergency stop.
   NOTE: NC/CNC machines and machining processes vary. Consult the manufacturer's operating manual to determine the specific method to execute the emergency stop.
9. Activate emergency stop control during machining.
10. Observe machine to verify that all controls are inactive and observe control panel for indicator light status.

KNOWLEDGE

Explain the reasons for and functions of the emergency stop procedure.
Identify and demonstrate the procedure for executing the emergency stop.
Read and interpret blueprints.
Read and interpret job specifications and orders.
Read and interpret machine manuals to determine operating procedures.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references
SOURCE OF ANALYSIS	V-TECS Catalog, Computerized Numerical Control, Performance Objective 93. V-TECS Curriculum Guide, Computerized Numerical Control, Performance Objective 93. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Goal 1-D: Ordering numbers. Goal 1-E: Application of properties of numbers and operations. Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform milling operations on NC/CNC machine

PERFORMANCE STANDARD Milling operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify milling operations.
2. Check setup to verify that:
   a. work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC milling operations.
Define technical terms associated with NC/CNC milling operations.
Identify the types and parts of NC/CNC milling machines.
Identify types, controls, and operation of NC/CNC milling machines.
Read and interpret blueprints, job specifications and orders to identify NC/CNC milling operations.

KNOWLEDGE (Cont.)

Read and interpret machine manuals to determine NC/CNC milling procedures.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

Team of incumbent workers

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform drilling operations on NC/CNC machine

PERFORMANCE STANDARD Drilling operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify drilling operations.
2. Check setup to verify that:
    a. Work holding device is securely attached and aligned.
    b. Part is installed in work holding device.
    c. Correct cutting tools are preset and installed.
    d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC drilling operations.
Define technical terms associated with NC/CNC drilling operations.
Identify the types and parts of NC/CNC drilling machines.
Identify types, controls, and operation of NC/CNC drilling machines.
Read and interpret blueprints, job specifications and orders to identify NC/CNC drilling operations.

KNOWLEDGE (Cont.)	Read and interpret machine manuals to determine NC/CNC drilling procedures. Use Machinery's Handbook or other technical references to determine machining data. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform boring operations on NC/CNC machine

PERFORMANCE STANDARD Boring operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify boring operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC boring operations.
Define technical terms associated with NC/CNC boring operations.
Identify the types and parts of NC/CNC boring machines.
Identify types, controls and operation of NC/CNC boring machines.
Read and interpret blueprints, job specifications and orders to identify NC/CNC boring operations.

KNOWLEDGE (Cont.)	Read and interpret machine manuals to determine NC/CNC boring procedures. Use Machinery's Handbook or other technical references to determine machining data. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform reaming operations on NC/CNC machine

PERFORMANCE STANDARD Reaming operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify reaming operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC reaming operations.

Define technical terms associated with NC/CNC reaming operations.

Identify the types and parts of NC/CNC machines.

Identify types, controls and operation of NC/CNC machines used for reaming.

Read and interpret blueprints, job specifications and orders to identify NC/CNC reaming operations.

KNOWLEDGE (Cont.)

Read and interpret machine manuals to determine NC/CNC reaming procedures.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform broaching operations on NC/CNC machine

PERFORMANCE STANDARD Broaching operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify broaching operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC broaching operations.
Define technical terms associated with NC/CNC broaching operations.
Identify the types and parts of NC/CNC broaching machines.
Identify types, controls, and operation of NC/CNC broaching machines.
Read and interpret blueprints, job specifications and orders to identify NC/CNC broaching operations.

KNOWLEDGE (Cont.)	Read and interpret machine manuals to determine NC/CNC broaching procedures. Use Machinery's Handbook or other technical references to determine machining data. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION	Machinist
DUTY AREA	Operating NC/CNC Machines
TASK	Perform turning operations on NC/CNC machine
PERFORMANCE STANDARD	Turning operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify turning operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC turning operations.
Define technical terms associated with NC/CNC turning operations.
Identify the types and parts of NC/CNC turning machines.
Identify types, controls and operation of NC/CNC turning machines.
Read and interpret blueprints, job specifications and orders to identify NC/CNC turning operations.

KNOWLEDGE (Cont.)

Read and interpret machine manuals to determine NC/CNC turning procedures.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
  Goal 1-A: Recognition, recall, and summarization of material read.
  Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  Goal 2-A: Meaning of spoken messages.
  Goal 2-B: Sequence of ideas from spoken messages.
  Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform forming operations on NC/CNC machine

PERFORMANCE STANDARD Forming operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify forming operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC forming operations.
Define technical terms associated with NC/CNC forming operations.
Identify types, parts, controls and operation of NC/CNC machines used to perform forming operations.
Read and interpret blueprints, job specifications and orders to identify NC/CNC forming operations.
Read and interpret machine manuals to determine NC/CNC forming procedures.

KNOWLEDGE (Cont.)	Use Machinery's Handbook or other technical references to determine machining data. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan, and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working around automated machinery. Use care when working with machine tools and machinist's hand tools to avoid injury.
EQUIPMENT AND MATERIALS	Job specifications, orders or blueprints NC/CNC machines Machinist's tool kit Technical references Precision measuring instruments
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-B: Sequence of ideas from spoken messages. Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-[illegible]: Relationship between competence and a potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform punching operations on NC/CNC machine

PERFORMANCE STANDARD Punching operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify punching operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part is installed in work holding device.
   c. Correct cutting tools are preset and installed.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC punching operations.

Define technical terms associated with NC/CNC punching operations.

Identify types, parts, controls and operation of NC/CNC machines used to perform punching operations.

Read and interpret blueprints, job specifications and orders to identify NC/CNC punching operations.

Read and interpret machine manuals to determine NC/CNC punching procedures.

KNOWLEDGE (Cont.)

Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform welding operations on NC/CNC machine

PERFORMANCE STANDARD Welding operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify welding operations.
2. Check setup to verify that:
   a. Work holding device is securely attached and aligned.
   b. Part or assembly is installed in work holding device.
   c. Correct welding wire is installed.
   d. Correct gases are connected if necessary.
   e. correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Clean and deburr workpiece.
    b. Select inspection tools.
    c. Calibrate inspection tools.
    d. Inspect workpiece.
    e. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC welding operations.

Define technical terms associated with NC/CNC welding operations.

Identify types, parts, controls and operation of NC/CNC machines used to perform welding operations.

Read and interpret blueprints, job specifications and orders to identify NC/CNC welding operations.

KNOWLEDGE (Cont.)

Identify the types of welding processes, materials and gases used in NC\CNC welding.
Read and interpret machine manuals to determine NC/CNC welding procedures.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Measuring instruments
Welding wire
Workpiece or assembly

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
  Goal 1-A: Recognition, recall, and summarization of material read.
  Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  Goal 2-A: Meaning of spoken messages.
  Goal 2-B: Sequence of ideas from spoken messages.
  Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform painting operations on NC/CNC machine

PERFORMANCE STANDARD Painting operations must be performed to produce a workpiece which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify painting operations.
2. Check setup to verify that:
    a. Work holding device is securely attached and aligned.
    b. Part or assembly is installed in work holding device or conveyor system.
    c. Correct painting equipment is preset and installed.
    d. Correct paint is mixed and installed.
    e. correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial workpiece.
10. Inspect part according to shop inspection standards:
    a. Inspect workpiece.
    b. Accept or reject workpiece according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC painting operations.

Define technical terms associated with NC/CNC painting operations.

Identify types, parts, controls and operation of NC/CNC machines used to perform painting operations.

Read and interpret blueprints, job specifications and orders to identify NC/CNC painting operations.

Read and interpret machine manuals to determine NC/CNC painting procedures.

KNOWLEDGE (Cont.)

Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Paint
Workpiece or assembly

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-B: Estimation of measurements.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
- Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
- Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
- Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.
- Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:
- Goal 1-P: Perception as our way of interpreting the world.
- Goal 1-Q: Time and space as dimensions which separate things and events.
- Goal 4-E: Measurement.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

TASK ANALYSIS

OCCUPATION Machinist

DUTY AREA Operating NC/CNC Machines

TASK Perform assembly operations on NC/CNC machine

PERFORMANCE STANDARD Assembly operations must be performed to produce a product or subassembly which meets blueprint and job specifications.

STEPS

1. Read and interpret job specifications, orders or blueprints to identify assembly operations.
2. Check setup to verify that:
   a. Work holding devices are securely attached and aligned.
   b. Parts are loaded in feed bins.
   c. Stations are aligned and set.
   d. Correct tools are preset and installed.
   e. Conveyor is adjusted.
   f. All feed mechanisms are adjusted.
   d. Correct program is loaded into memory.
3. Perform control on sequence.
4. Perform zeroing sequence.
5. Verify program number.
6. Search for and set safe start-up location.
7. Set control to automatic cycle mode or single block mode. (See manufacturer's operating guide for specific instructions.)
8. Activate automatic cycle mode control.
9. Run trial assembly.
10. Inspect assembly according to shop inspection standards:
    a. Select inspection tools.
    b. Calibrate inspection tools.
    c. Inspect assembly.
    d. Accept or reject assembly according to shop inspection standards.
11. Adjust machine if necessary.

KNOWLEDGE

Identify and demonstrate the procedures for performing NC/CNC assembly operations.

Define technical terms associated with NC/CNC assembly operations.

Identify types, parts, controls and operation of NC/CNC machines used to perform assembly operations.

KNOWLEDGE (Cont.)

Explain the operating principles and functions of NC/CNC assembly machines.
Identify the types and parts of feed and conveyor systems.
Read and interpret blueprints, job specifications and orders to identify NC/CNC assembly operations.
Read and interpret machine manuals to determine NC/CNC assembly procedures.
Use Machinery's Handbook or other technical references to determine machining data.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan, and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working around automated machinery.
Use care when working with machine tools and machinist's hand tools to avoid injury.

EQUIPMENT AND MATERIALS

Job specifications, orders or blueprints
NC/CNC machines
Machinist's tool kit
Technical references
Precision measuring instruments

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-B: Sequence of ideas from spoken messages.
- Goal 2-F: Effective and appropriate responses.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

Goal 1-A: Ability to read, write and name numbers in several different ways.
Goal 1-B: Ability to perform operations with numbers with and without a calculator.
Goal 1-D: Ordering numbers.
Goal 1-E: Application of properties of numbers and operations.
Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
Goal 2-A: Interpretation of ratios.
Goal 2-C: Application of ratios and proportions to real-life situations.
Goal 3-A: Measurement in various contexts using appropriate units.
Goal 3-B: Estimation of measurements.
Goal 3-D: Conversion of units within one system and from one system to another.
Goal 3-E: Application of selected measurement systems, instruments, and techniques.
Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
Goal 5-A: Simple geometric figures and patterns of relationships in two and three dimensions.
Goal 5-D: Application of the Pythagorean Theorem and common right triangle relationships.
Goal 5-E: Definition of common geometric figures and methods of using deductive reasoning to relate properties of those figures.
Goal 7-D: Ability to determine whether an estimate is a better alternative than an exact value.
Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Social Sciences:

Goal 5-I: Roles of the individual in the world of work.
Goal 5-J: Relationships between competence and potential.

Biological and Physical Sciences:

Goal 1-P: Perception as our way of interpreting the world.
Goal 1-Q: Time and space as dimensions which separate things and events.
Goal 4-E: Measurement.

Physical Development and Health:

Goal 3-A: Safe and appropriate use of equipment in physical activities.
Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

IL88CD04 019100

Education
For
Employment
Task Lists

Illinois
State Board of
Education

Adult
Vocational and
Technical Education

1988

TASK ANALYSIS

FOR

INDUSTRIAL OCCUPATIONS

CLUSTER: **GRAPHIC COMMUNICATIONS**
OCCUPATION: **COMPOSITOR and/or TYPESETTER**
Duty Area: Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

BEST COPY AVAILABLE

"KEY TO EFFECTIVE LEARNING"

Illinois Competency Based Vocational
Education Project
Housed At: Lake County Area
Vocational Center
19525 West Washington Street
Grayslake, IL 60030-1194
(312) 223-6681 or 620-8770

Tasks Analyzed by:

CBVE Project Director	Urban T. Oen, Ph.D.
CBVE Industrial Occupations Consultant	Dave Dimmlich
CBVE Project Director	Urban T. Oen, Ph.D.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Enter layout specifications on typesetting or desktop publishing equipment

PERFORMANCE STANDARD The resulting copy must match the job layout specifications.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job ticket or work order.
2. Power on the unit.
3. Insert film or photo paper.
4. Clear the screen and photo unit memories.
5. Insert fonts if using phototypesetting publishing equipment.
6. Load the operating program from the user program diskette.
7. Insert the job diskette.
8. Initialize the system.
    a. Select fonts.
    b. Select point size.
    c. Select word spacing.
    d. Select letter spacing.
    e. Select character compensation.
    f. Select hyphenation.
    g. Select line length.
    h. Select line spacing.
    i. Select line ending.
    j. Select margins.
    k. Set tabs.
    l. Select style of type according to job ticket or marked-up copy.

For digital typesetters, if the job requires text manipulation, rotated text, reverse video, expanded or condensed type or other special features, do also the following:

9. Call function command for desired feature.
10. Initialize particular command.
11. Select point size and font for desired result. For italics, choose a sans serif font and degrees of slant.
12. Compose copy.
13. Turn function command off.

KNOWLEDGE	Locate and use parts of phototypesetting, digital or desktop publishing equipment. Identify uses of special function keys. Interpret instructions and operator's manuals. Identify printer's terms. Interpret job specifications. Use printer's measuring system including ratio, proportion, points, picas and percentages. Distinguish between acceptable and nonacceptable standards. Identify types of ribbons, fonts, film and paper. Locate and use the icons of the desktop system being used. Change the size and position of windows using the size box and the title bar. Pull down menus and choose commands. Identify and use desktop and software application terms such as click, double-click, drag, shift-click, dialog, box, list box, folder, button and alert box.
ATTITUDES	Complete layout specifications in an accurate and timely manner. Assume responsibility for decisions made while laying out the specifications. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Phototypesetter, digital or desktop equipment Operator's manuals Fonts Job ticket Copy Line gauge Program diskettes Microcomputer Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 2-E: Application of percents in real-life situations.
- Goal 3-B: Estimation of measurements.
- Goal 3-E: Application of selected measurement systems, instruments and techniques.

Language Arts:

- Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION

Compositor and/or Typesetter

DUTY AREA

Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK

Write formats for typesetting or desktop publishing equipment

PERFORMANCE STANDARD

The final plan must include all the copy and conform to the allotted space. Copy is coded for type styles, leadings, line length and point sizes.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used.

1. Collect copy to be set, supplies and tools.
2. Read customer production sheet.
3. Refer to available composition type styles and sizes.
4. Refer to comprehensive layout for layout plans.
5. Compute amount of body type space available.
6. Label all body type for type style, type size and line length.
7. Label copy heads for type style, type size and line length.
8. Label line, paragraph and leading to fit available copy space.

KNOWLEDGE

Follow instructions of phototypesetting, digital and desktop publishing equipment as formats are written.
Identify printer's terms.
Use printer's measuring system including ratio, proportion, points, picas and percentages.
Follow procedures established by company in writing formats.
Use publishing system terms.
Use software application packages.

ATTITUDES

Assume responsibility for decisions made while writing formats for typesetting equipment.
Prepare the formats accurately and in a timely manner.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.
Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Customer copy Company order Comprehensive layout plans Operator's manuals
SOURCE OF ANALYSIS	V-TECS Catalog, Printing Occupations, Performance Objective 11. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators. Goal 2-A: Interpretation of ratios. Goal 2-C: Application of ratios and proportions to real-life situations. Goal 2-E: Application of percents in real-life situations. Goal 3-B: Estimation of measurements. Goal 3-E: Application of selected measurement systems, instruments and techniques. Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Receive off-line data

PERFORMANCE STANDARD The output document must be an exact copy of the one contained on the customer diskette.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used.

1. Obtain customer diskette and job ticket.
2. Insert diskette in a sending unit, such as microcomputer with modem.
3. Match typesetter or receiving unit to sending unit.
    a. Select bit (baud) rate.
    b. Set protocol.
    c. Select parity and stop bits.
4. Enter file name.
5. Select modem or terminal.
6. Send translation table after communications ready light comes on.
7. Send copy.
8. Terminate transmission.
9. Exit communications mode.
10. Remove output and give to supervisor.
11. Remove diskette from sending unit and give to supervisor.
12. Turn off sending unit.

KNOWLEDGE

Locate and use parts of a typesetting machine, microcomputer and printer.
Identify uses of special function keys.
Interpret instructions and operator's manuals.
Interpret job specifications.
Identify types of fonts, film and paper.
Insert and adjust film and paper in typesetting equipment and printers.
Follow procedures established by company to label and file magnetic media.
Use publishing system terms.
Use software application packages.

ATTITUDES	Assume responsibility for decisions made while receiving off-line data. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Printer Fonts Program diskettes Customer diskette or tape Film and paper Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Receive telecommunication data

PERFORMANCE STANDARD The document received via telecommunications must be an exact copy of the one which was transmitted.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used.

1. Ready equipment.
    - a. Turn on typesetter, clear the screen and photo unit memories, insert film, insert fonts, load the operating program from the user program diskette, and initialize the system; or
    - b. Log on computer if using terminal/computer mainframe, minicomputer or microcomputer.
    - c. Connect telephone outlet to unit.
    - d. Turn on modem and telecommunications terminal, if needed.
2. Set up telecommunications session.
3. Contact supervisor or person sending transmission to clarify any questions.
4. Input commands to receive transmission.
5. Watch for end-of-file transfer.
6. Print transmitted data.
7. Review printed copy of transmitted data to be sure data is complete.
8. Have data transmitted again if it is incomplete.
9. Store (save) transmitted data.
10. Name file in which transmitted data was stored (saved).
11. Disseminate printed copy of transmitted data to appropriate person.
12. Follow company procedures for retaining copy of transmitted data by filing it or distributing it to appropriate person for filing.
13. Turn off modem and telecommunications terminal at conclusion of transmission, if needed.
14. Remove diskette from disk drive; label and file diskette.
15. Turn off other equipment, or log off computer.

KNOWLEDGE

Receive data via telecommunications equipment following procedures identified in equipment manual or software reference materials.
Input commands to receive data via modem using touch method of keyboarding.
Identify signal that indicates transmission is completed.
Input commands to print and store (save) data transmitted via modem.
Follow procedure identified in equipment manual or software reference materials to name files.
Proofread printed copies of transmitted data for correctness of content and format.
Follow procedures established by company for retaining copies of transmitted data.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter, minicomputer, microcomputer or mainframe computer.
Identify uses of special function keys for specific typesetter and computer software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off computer.
Identify parts of modem.
Identify parts of telecommunications terminal.
Insert and adjust paper in typesetter.

ATTITUDES

Receive data via telecommunications accurately and in a timely manner.
Assume responsibility for decisions made while receiving data via telecommunications.
Maintain confidentiality of data received via telecommunications.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment, modem, telecommunications terminal, diskette(s) and printed copies of transmitted data to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint transmitted data.
Remove excess paper from work area when job is completed.
Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work.
Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen.
Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."

EQUIPMENT AND MATERIALS	Phototypesetter, digital typesetter, microcomputer, computer mainframe or minicomputer Laser printer Film or paper Telecommunications terminal Modem Telephone Communications software or integrated software package Software reference materials Initialized (formatted) diskette Company procedures manual Company style manual or general reference manual for office personnel Operator's manuals Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Check system error report/documentation
PERFORMANCE STANDARD	The system must run correctly with no error messages appearing on the screen.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Read error message. 2. Correlate system error number with system hardware/software manuals and information sheets. 3. Read what the error is. 4. Make the correction on the unit. 5. Contact supervisor if error message remains on screen.
KNOWLEDGE	Identify parts of a typesetter or microcomputer and printer. Use a typesetter or microcomputer. Follow procedures in equipment manual and software reference materials to correct system errors. Identify appropriate responses to messages or prompts on monitor. Use publishing system terms. Use software application packages.
ATTITUDES	Assume responsibility for decisions made while checking system errors. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Software manuals Operator's manuals Laser printer Microcomputer Desktop publishing software package

SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Determine if hardware/software problem

PERFORMANCE STANDARD The problem will be identified and corrected. The system will operate properly without problem messages.

STEPS

NOTE: Order of steps and procedures followed may vary depending on equipment and software being used. Many systems provide systems diagnostics that determine whether the problem is software or hardware related and what part of the system is having problems.

1. Read error message.
2. Follow diagnostics directions or correlate system error number with operations manuals.
3. Make the correction on the unit.
4. Begin to enter information.

Do the following if the error message reappears:

5. Reset the system (reboot the software).
    a. If the problem goes away, it was a software problem. See steps 6-11 below.
    b. If problem does not go away, it is a hardware problem. See steps 12-17 below.

Software Problem

6. Begin to enter information.
7. Read error message.
8. Correlate system error number with software operations manuals.
9. Read what the error is.
10. Make the correction on the unit.
11. Go to step 12 if error message remains on screen.

Hardware Problem

12. Check all connections, bolts and nuts and tighten if loose.
13. Reset the system.
14. Read error message and refer to system hardware manual.
15. Read what the error is.
16. Make the correction on the unit.
17. Contact supervisor or order repair service if error message remains on screen.

KNOWLEDGE	Identify parts of typesetter, microcomputer and printer. Use typesetter, microcomputer and printer. Follow procedures in equipment and software reference manuals to determine hardware/software problem. Identify appropriate responses to messages or prompts on monitor.
ATTITUDES	Assume responsibility for decisions made while checking system for hardware/software problem. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Software manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Correct coding
PERFORMANCE STANDARD	Final document is error-free and matches customer job order.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Determine which code is wrong. (Is it a type size or line code?) 2. Rejustify the job. (Not done on digital.) 3. Move cursor to coding error point. (Done in background processing on digital.) 4. Determine error. 5. Correct error. 6. Rejustify the job. 7. Save file.
KNOWLEDGE	Use typesetter or microcomputer. Follow procedures in equipment and software reference manuals to determine coding error. Identify appropriate responses to messages or prompts on monitor. Use software application packages.
ATTITUDES	Assume responsibility for decisions made while correcting coding. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Determine and set margins, leadings and tabs

PERFORMANCE STANDARD The margins, leadings and tabs which match job specifications are set on the equipment.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Power on the unit.
2. Review job ticket or work order.
3. Clear the screen and photo unit memories.
4. Insert fonts or set width values:
    a. Insert fonts on phototypesetter.
    b. Call up width values and select those desired for digital typesetter.
    c. Select fonts desired for desktop system.
5. Load the operating program from the user program disk.
6. Insert the job disk.
7. Initialize the system.
8. Set the margins.
9. Set the leadings (line space).
10. Set the tabs.
    a. Activate tab mode.
    b. Enter preliminary instructions for tab parameters.
        1) Reference number for each tab.
        2) The indent of the tab from the left margin.
        3) The line length of the tab.
        4) The position of the copy within the tab.
    c. Enter positioning code.
    d. Deactivate tab mode.

KNOWLEDGE
Locate and use parts of a typesetting machine.
Identify uses of special function keys.
Interpret instructions and operator's manuals.
Interpret job specifications.
Use printer's measuring system including ratios, proportions, fractions and percentages.
Identify types of fonts.
Change the size and position of windows in desktop systems.
Use software application packages.

KNOWLEDGE (Cont.)

Locate and use the icons of the desktop system being used.
Pull down menus and choose commands.
Identify and use desktop and software applications terms.

ATTITUDES

Set margins, leadings and tabs on typesetting and desktop publishing equipment in an accurate and timely manner.
Assume responsibility for decisions made while determining and setting margins, leadings and tabs.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.
Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS

Typesetter
Microcomputer
Job ticket or work order
Diskettes
Fonts
Program diskettes
Operator's manuals
Laser printer
Desktop publishing software package

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-A: Interpretation of ratios.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 2-E: Application of percents in real-life situations.
- Goal 3-B: Estimation of measurements.
- Goal 3-E: Application of selected measurement systems, instruments and techniques.

Language Arts:
- Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Determine and set light density on phototypesetting equipment

PERFORMANCE STANDARD The output must be free of gray, and the letters must be sharp.

STEPS NOTE: This is not a task for digital typesetters. For phototypesetters, the order of steps may vary depending on the equipment and software being used.

1. Examine copy for blackness or grayness. If black, go to steps 2-5; if gray, go to steps 6-9.

If black, follow these steps:

2. Examine letters with a magnifier to determine if the edges are fuzzy. If fuzzy, density is too high.
3. Open the filmstrip compartment and turn density setting knob one setting higher if copy is too light and one setting lower if copy is too dark.
4. Print out the copy again and check the density.
5. Repeat steps 1-4 until the density is correct.

If gray, follow these steps:

6. Change the chemicals and the heat setting in the processor.
7. Print out and examine copy again. If still gray, open the filmstrip compartment and turn the density setting knob one setting higher.
8. Print out copy and check again for grayness.
9. Repeat steps 7-8 until the gray is removed.

KNOWLEDGE Interpret instructions and operator's manuals.
Identify printer's terms.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.

ATTITUDES Assume responsibility for decisions made while determining and setting density on phototypesetting equipment.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.

Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS

- Phototypesetter
- Job ticket or work order
- Operator's manuals
- Diskettes
- Fonts

SOURCE OF ANALYSIS

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Mathematics:
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 2-C: Application of ratios and proportions to real-life situations.
- Goal 2-E: Application of percents in real-life situations.
- Goal 3-B: Estimation of measurements.

Language Arts:
- Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Set justification on phototypesetting equipment
PERFORMANCE STANDARD	
STEPS	This task does not exist because all phototypesetters automatically set justification after the operator hits quad left, quad middle or quad right.
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Adjust parameters throughout job on typesetting or desktop publishing equipment
PERFORMANCE STANDARD	Parameter changes must be consistent with style and type selected by customer and as reflected on work order.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. Also these steps may be automated with some mouse-driven systems for copy fitting. 1. Identify parameter changes needed. 2. Adjust point size or size of field to fit customer's needs. NOTE: Point size selected must match the lens configuration of the machine. (Applicable only to phototypesetters.) 3. Adjust line spacing. 4. Adjust style of type. 5. Adjust line length.
KNOWLEDGE	Identify uses of special function keys. Interpret instructions and operator's manuals. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Identify fonts. Pull down menus and choose commands. Locate and use the icons of the desktop system being used. Change the size and position of windows. Use software application packages.
ATTITUDES	Assume responsibility for decisions made while adjusting parameters. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Keyboard newspaper and newsletter copy on typesetting or desktop publishing equipment

PERFORMANCE STANDARD Newspaper and newsletter copy must be input in accordance with established company or newspaper standards, must be error-free and must meet customer specifications when printed.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job ticket or work order.
2. Ready equipment.
    a. Turn on phototypesetter, digital typesetter or microcomputer.
    b. Insert film and/or paper.
    c. Clear the screen and photo unit memories.
    d. Insert fonts.
    e. Load the operating program from the user program diskette.
3. Insert the job diskette.
4. Initialize the system.
5. Contact supervisor or originator to clarify any questions.
6. Create and name file.
7. Set up format (fonts, point size, word spacing, letter spacing, character compensation, hyphenation, line length, line spacing, line ending, margins, tabs, headers or footers, special features and style sheet).
8. Input newspaper or newsletter copy.
9. Paginate or repaginate if necessary.
10. Run spelling check, if available.
11. Proofread copy while still on the monitor or print out job for hard-copy proofing.
12. Edit copy.
13. Store (save) copy.
14. Print copy.
15. Proofread hard copy using proofreader's symbols.
16. Input any corrections.
17. Repeat steps 9-16 until all errors have been found and corrected.
18. Submit hard copy, work order and original copy to supervisor or originator for approval or revision.

STEPS
(Cont.)

19. Input originator or supervisor revisions.
20. Repeat steps 9-19 until copy is finalized.
21. Run hard copy through a processor if necessary.
22. Return finalized hard copy, work order and original copy to supervisor or originator for final approval.
23. Follow company procedures for retaining copy of work.
24. Remove diskette from typesetter or microcomputer; label and file diskette.

KNOWLEDGE

Format newsletter and newspaper copy following company or newspaper standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for newspaper and newsletter copy.
Format newspaper and newsletter using software style sheet.
Format headers or footers.
Format enumeration.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter or microcomputer.
Identify uses of special function keys for specific software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off typesetter or microcomputer.
Identify computer terms.
Use software application packages.
Locate and use the icons of the desktop system being used.
Change the size and position of windows.
Pull down menus and choose commands.
Open, copy and delete documents using the finder.
Scroll in a window or list box using the scroll bars and scroll box.
Use the clipboard to store information.
Identify and use desktop and software applications terms.

ATTITUDES	Prepare newsletter and newspaper copy accurately. Assume responsibility for decisions made while preparing newsletter and newspaper copy. Maintain confidentiality of information. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from typesetter or microcomputer, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Keyboard invoice, application, billing and other forms on typesetting or desktop publishing equipment

PERFORMANCE STANDARD The copy of invoices and other forms must be input in accordance with established company standards, must be error-free and must meet customer specifications when printed.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review work order or job ticket.
2. Review marked-up copy noting line lengths, styles, tabs and line spacing.
3. Ready equipment.
    a. Turn on typesetter or microcomputer.
    b. Insert film and/or paper.
    c. Clear the screen and photo unit memories.
    d. Insert fonts. (Not on digital and desktop systems.)
    e. Load the operating program from the user program diskette.
4. Insert the job diskette.
5. Initialize the system.
6. Create and name file.
7. Contact supervisor or originator to clarify any questions.
8. Set up format (fonts, point size, word spacing, letter spacing, character compensation, hyphenation, line length, line spacing, line ending, margins, tabs, headers or footers, special features and style sheet).
9. Type copy.
10. Paginate or repaginate if necessary.
11. Run spelling check, if available.
12. Insert horizontal lines where needed.
13. Insert vertical lines.
14. Proofread copy while still on the monitor or print out job for hard copy proofreading.
15. Edit copy.
16. Store (save) copy.
17. Print copy.
18. Proofread hard copy using proofreader's symbols.
19. Input any corrections.

STEPS
(Cont.)

20. Repeat steps 9-16 until all errors have been found and corrected.
21. Submit hard copy, work order and original copy to supervisor or originator for approval or revision.
22. Input originator or supervisor revisions.
23. Repeat steps 10-22 until copy is finalized.
24. Run hard copy through a processor if necessary.
25. Return finalized hard copy, work order and original copy to supervisor or originator for final approval.
26. Follow company procedures for retaining copy of work.
27. Remove diskette from typesetter or microcomputer; label and file diskette.

KNOWLEDGE

Format copy of invoices and other forms following company standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for invoices and forms.
Format copy using software style sheet.
Format headers or footers.
Format enumerations.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter or microcomputer.
Identify uses of special function keys for specific software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off typesetter or microcomputer.
Identify computer terms.
Use software application packages.
Locate and use the icons of the desktop system being used.
Change the size and position of windows.
Open, copy and delete documents using the finder.
Identify and use desktop and software applications terms.
Pull down menus and choose commands.

ATTITUDES	Visualize finished product. Prepare invoices and forms accurately. Assume responsibility for decisions made while preparing invoices and other forms. Maintain confidentiality of information. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from typesetter or microcomputer, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Initialized (formatted) diskettes Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Keyboard display advertising copy on typesetting or desktop publishing equipment

PERFORMANCE STANDARD Display advertising copy must be input in accordance with established company standards, must be error-free and must meet customer specifications when finished.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job ticket or work order.
2. Review marked-up copy and visualize how the copy will come out.
3. Ready equipment.
   a. Turn on typesetter or microcomputer.
   b. Insert film and/or paper.
   c. Clear the screen and photo unit memories.
   d. Insert fonts. (Not on digital and desktop systems.)
   e. Load the operating program from the user program diskette.
4. Insert the job diskette.
5. Initialize the system.
6. Contact supervisor or originator to clarify any questions.
7. Create and name file.
8. Set up format (fonts, point size, word spacing, letter spacing, character compensation, hyphenation, line length, line spacing, line ending, margins, tabs, headers or footers, special features and style sheet).
9. Input display advertising copy.
10. Paginate or repaginate if necessary.
11. Run spelling check, if available.
12. Proofread copy while still on the monitor or print out job for hard-copy proofreading.
13. Edit copy.
14. Store (save) copy.
15. Print copy.
16. Proofread hard copy using proofreader's symbols.
17. Input any corrections.
18. Repeat steps 9-17 until all errors have been found and corrected.
19. Submit hard copy, work order and original copy to supervisor or originator for approval or revision.

STEPS
(Cont.)

20. Input originator or supervisor revisions.
21. Repeat steps 10-20 until copy is finalized.
22. Run hard copy through a processor if necessary.
23. Return finalized hard copy, work order and original copy to supervisor or originator for final approval.
24. Follow company procedures for retaining copy of work.
25. Remove diskette from typesetter or microcomputer; label and file diskette.

KNOWLEDGE

Format display advertising copy following company standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for display advertising copy.
Format copy using software style sheet.
Format headers or footers.
Format enumerations.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter or microcomputer.
Identify uses of special function keys for specific software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off typesetter or microcomputer.
Identify computer terms.
Use software application packages.
Locate and use the icons of the desktop system being used.
Change the size and position of windows.
Pull down menus and choose commands.

ATTITUDES

Visualize finished product.
Prepare display advertising copy accurately.
Assume responsibility for decisions made while preparing display advertising copy.
Maintain confidentiality of information.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from typesetter or microcomputer, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Initialized (formatted) diskettes Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Keyboard letterhead, envelope, business card copy, books, manuals, reports, brochures, circulars or flyers on typesetting or desktop publishing equipment

PERFORMANCE STANDARD Copy must be input in accordance with established company standards, must be error-free and must meet customer specifications when printed.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job ticket or work order.
2. Review marked-up copy and visualize how the copy will come out.
3. Ready equipment.
    a. Turn on typesetter or microcomputer.
    b. Insert film and/or paper.
    c. Clear the screen and photo unit memories.
    d. Insert fonts. (Not on digital and desktop systems.)
    e. Load the operating program from the user program diskette.
4. Insert the job diskette.
5. Initialize the system.
6. Contact supervisor or originator to clarify any questions.
7. Create and name file.
8. Set up format (fonts, point size, word spacing, letter spacing, character compensation, hyphenation, line length, line spacing, line ending, margins, tabs, headers or footers, special features and style sheet).
9. Input copy.
10. Paginate or repaginate if necessary.
11. Run spelling check, if available.
12. Proofread copy while still on the monitor or print out job for hard-copy proofing.
13. Edit copy.
14. Store (save) copy.
15. Print copy.
16. Proofread hard copy using proofreader's symbols.
17. Input any corrections.
18. Repeat steps 10-17 until all errors have been found and corrected.

STEPS
(Cont.)

19. Submit hard copy, work order and original copy to supervisor or originator for approval or revision.
20. Input originator or supervisor revisions.
21. Repeat steps 10-20 until copy is finalized.
22. Run hard copy through a processor.
23. Return finalized hard copy, work order and original copy to supervisor or originator for final approval.
24. Follow company procedures for retaining copy of work.
25. Remove diskette from typesetter or microcomputer; label and file diskette.

KNOWLEDGE

Format copy following company standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for copy.
Format copy using software style sheet.
Format headers or footers.
Format enumerations.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter or microcomputer.
Identify uses of special function keys for specific software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off typesetter or microcomputer.
Identify computer terms.
Use software application packages.
Locate and use the icons of the desktop system being used.
Change the size and position of windows.
Pull down menus and choose commands.

ATTITUDES

Visualize finished product.
Prepare copy accurately.

ATTITUDES (Cont.)	Assume responsibility for decisions made while preparing copy. Maintain confidentiality of information. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from typesetter or microcomputer, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Initialized (formatted) diskettes Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Keyboard lists, indexes and tables on typesetting or desktop publishing equipment

PERFORMANCE STANDARD Copy must be input in accordance with established company standards, must be error-free and must meet customer specifications when printed.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job ticket or work order.
2. Review marked-up copy and visualize how the copy will come out.
3. Ready equipment.
    a. Turn on typesetter or microcomputer.
    b. Insert film and/or paper.
    c. Clear the screen and photo unit memories.
    d. Insert fonts. (Not on digital and desktop systems.)
    e. Load the operating program from the user program diskette.
4. Insert the job diskette.
5. Initialize the system.
6. Contact supervisor or originator to clarify any questions.
7. Create and name file.
8. Set up format (fonts, point size, word spacing, letter spacing, character compensation, hyphenation, line length, line spacing, line ending, margins, tabs, headers or footers, special features and style sheet).
9. Input copy.
10. Paginate or repaginate if necessary.
11. Run spelling check, if available.
12. Proofread copy while still on the monitor or print out job for hard-copy proofing.
13. Edit copy.
14. Store (save) copy.
15. Print copy.
16. Proofread hard copy using proofreader's symbols.
17. Input any corrections.
18. Repeat steps 10-17 until all errors have been found and corrected.
19. Submit hard copy, work order and original copy to supervisor or originator for approval or revision.

STEPS
(Cont.)

20. Input originator or supervisor revisions.
21. Repeat steps 9-19 until copy is finalized.
22. Run hard copy through a processor.
23. Return finalized hard copy, work order and original copy to supervisor or originator for final approval.
24. Follow company procedures for retaining copy of work.
25. Remove diskette from typesetter or microcomputer; label and file diskette.

KNOWLEDGE

Format copy following company standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for copy.
Format copy using software style sheet.
Format headers or footers.
Format enumerations.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.
Follow procedures established by company for labeling and filing magnetic media.
Locate and use parts of typesetter or microcomputer.
Identify uses of special function keys for specific software being used.
Identify appropriate responses to messages or prompts on monitor.
Log on or off typesetter or microcomputer.
Identify computer terms.
Use software application packages.
Locate and use the icons of the desktop system being used.
Change the size and position of windows.
Pull down menus and choose commands.

ATTITUDES

Visualize finished product.
Prepare copy accurately.
Assume responsibility for decisions made while preparing copy.
Maintain confidentiality of information.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from typesetter or microcomputer, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Initialized (formatted) diskettes Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Enter keyboarded copy into memory
PERFORMANCE STANDARD	All copy is entered into memory with the format intact.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Rejustify copy on screen. (Not with digital as it is automated.) 2. Type in file name. 3. Execute copy in memory. (Save the file.) Check to see that the drive light comes on as copy is stored on diskette. 4. Remove diskette when screen goes blank.
KNOWLEDGE	Identify uses of special function keys. Interpret instructions and operator's manuals. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Enter keyboard copy into memory in an accurate and timely manner. Assume responsibility for decisions made while laying out the specifications. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket

EQUIPMENT AND MATERIALS (Cont.)	Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Enter keyboarded copy into photo unit
PERFORMANCE STANDARD	All copy is entered into memory and sent to the processor without loss of format or data.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Rejustify copy on screen. (Not with digital as it is automated.) 2. Type in file name. 3. Set file command with type. (Put on disk and send to photo unit.) 4. Execute copy in memory. (Save the file.) 5. Cue to output. 6. Run phototypeset copy through processor. Run desktop and digital output to laser printer with plain paper for output and proof copy.
KNOWLEDGE	Identify uses of special function keys. Interpret instructions and operator's manuals. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Enter keyboarded copy into photo unit in an accurate and timely manner. Assume responsibility for decisions made while entering copy into unit. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Enter formats for page pagination on typesetting or desktop publishing equipment

PERFORMANCE STANDARD Output must be page numbered as shown on work order.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

For nonautomated equipment, follow steps 1-8 below:

1. Call the first record of the galley to the screen.
2. Place the cursor at the point at which the vertical measurement is to begin.
3. Strike the measurement depth key.
4. Type in the digits which represent the specific depth required in picas and points.
5. Strike the appropriate key to execute or begin the counting procedure.
6. Insert extra line spacings, footnotes, page numbers and the like.
7. Store or save the page and establish file name.
8. Continue paging procedures.

For mouse-driven and/or automated equipment, follow steps 9-12 below:

9. Call in file name.
10. Describe the page or enter type of pagination desired.
11. Store file.
12. Output copy.

KNOWLEDGE

Identify uses of special function keys.
Operate phototypesetter.
Interpret instructions and operator's manuals.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Use software application packages.

ATTITUDES

Enter formats for pagination in an accurate and timely manner.
Assume responsibility for decisions made while entering formats for pagination.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	EditWriter II Operator's Manual, Compugraphic Corporation. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Load fonts into output devices
PERFORMANCE STANDARD	The fonts loaded into the output devices must match the type style and sizes selected by the customer and shown on the work order.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. For digital and automated systems, the fonts are stored on-line in a font library. The front-end system has a font index and a font number to call for the parameters. 1. Turn on system. 2. Load the utility program. 3. Load the front-end and back-end system's program diskettes or call up from on-line systems. 4. Select job to be typeset or published. 5. Initialize a font diskette or call up. 6. Load font information or call up. 7. Insert the master font diskette or call up. 8. Create a customer font diskette. 9. Remove master font diskette. 10. Load font width information on front-end system program diskette or enter temporarily in system. 11. Verify font widths. 12. Load digital information into memory which is used by the back-end system to typeset.
KNOWLEDGE	Identify uses of special function keys. Identify different fonts. Operate typesetter or microcomputer. Interpret instructions and operator's manuals. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Load fonts in an accurate and timely manner. Assume responsibility for decisions made while loading fonts in output devices. In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	EditWriter II Operator's Manual, Compugraphic Corporation. Series 300 Operator's Manual, Allied Linotype, 1985. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Load typesetter with film or paper

PERFORMANCE STANDARD Typesetter is loaded correctly with correct photographic paper or film.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Turn on typesetter.
2. Select correct photographic paper or film.
3. Open take-up cassette compartment and remove cassette from unit.
4. Remove the lower cover of the material transport assembly.
5. Open the pressure plate by releasing the pivot latches on each side of the assembly or open the compartment designed to accommodate the supply cassette. (Adjust width guide if necessary.)
6. Pull out eight to ten inches of photographic paper or as directed from the box or cassette and cut or shape the leading edge as directed.
7. Place the box or cassette centrally in the supply compartment with the emulsion side facing in.
8. Align the paper between the guidelines or adjust the width guide.
9. Push the exposed paper through the feed slot to the take-up cassette.
10. Close and lock the pressure plate.
11. Advance the photographic film into the take-up cassette compartment.
12. Check to see that the paper is straight and that the edges are aligned with the guide marks.
13. Cut off excess exposed paper.
14. Replace the take-up cassette between the guides in the upper compartment as directed.
15. Close the compartment cover.
16. Advance the film a few inches.
17. Reset the film counter to zero.

KNOWLEDGE Locate and use parts of a typesetter.
Interpret instructions and operator's manuals.
Identify photographic film and paper.

KNOWLEDGE (Cont.)	Use software application packages. Distinguish between acceptable and nonacceptable standards for loading film or paper.
ATTITUDES	Load film and paper in typesetter in an accurate and timely manner. Assume responsibility for decisions made while loading the typesetter with film or paper. In addition, refer to Employability Skills List.
SAFETY	Avoid sharp edges of paper and typesetter.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Photographic film or paper Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	EditWriter II Operator's Manual, Compugraphic Corporation. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Proofread typeset copy on screen

PERFORMANCE STANDARD Errors must be identified and corrected by typesetter.

STEPS

1. Save work.
2. Run spell check if available.
3. Scroll work on screen and proofread each line to identify typographic errors.
4. Compare typeset copy to original looking for errors or omissions and format deviations.
5. Move cursor to error points and make corrections.
6. Rejustify the job. (Automatic on automated systems.)
7. Save the file.
8. Place film in processor or phototypesetter or transmit data to back-end device to produce a hard copy or to laser printer for plain paper copy.
9. Submit hard copy to proofreader and customer for approval.

KNOWLEDGE

Use company style manual or general reference manual for office personnel to determine if document format is correct.
Proofread for correctness of content, spelling, format, punctuation, capitalization and word divisions.
Use dictionary or word division manual to locate correct spelling of words or appropriate end-of-line word divisions.
Use software application packages.

ATTITUDES

Proofread copy in an accurate and timely manner.
Assume responsibility for decisions made while proofreading documents.
Follow directions willingly.
Must have good concentration.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Proofreader's handbook Dictionary Operator's manuals Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION

Compositor and/or Typesetter

DUTY AREA

Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK

Produce phototypeset soft-copy reader proof

PERFORMANCE STANDARD

Soft-copy reader proof must match the layout specifications and be free of errors.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used. (These steps apply only to phototypesetters.)

1. Store customer file on diskette in phototypesetter.
2. Remove customer file diskette.
3. Turn on typeview and wait until unit warms up.
4. Load the front-end system program.
5. Load the typeview program.
6. Load the typeview with the fonts used in the customer job.
7. Send a file to the typeview.
8. Display the file on typeview screen.
9. Enlarge or reduce the display.
10. Redisplay a specific portion of the file if desired.
11. Scroll the typeview cursor to see entire file.
12. Display next file or release file.

KNOWLEDGE

Identify uses of special function keys.
Identify different fonts.
Operate phototypesetter.
Operate back-end system.
Interpret instructions and operator's manual.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Use software application packages.

ATTITUDES

Produce soft-copy reader proof in an accurate and timely manner.
Assume responsibility for decisions made while producing a soft-copy reader proof.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Phototypesetter Operator's manuals Fonts Copy Job ticket Diskettes
SOURCE OF ANALYSIS	Series 300 Operator's Manual, Allied Linotype, 1985.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Produce typeset hard-copy reader proof
PERFORMANCE STANDARD	Hard copy must match the layout specifications and be free of errors.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Connect line printer (back-end device) to CRT (front-end device) with a cable. 2. Identify the line printer in the channel parameters. 3. Copy the revised channel parameters onto the front-end system program. 4. Copy the printer table onto the front-end system program. 5. Turn on the line printer. 6. Insert markers to indicate what to output. 7. Enter the background command or print command. 8. Print out desired copy.
KNOWLEDGE	Identify uses of special function keys. Identify different fonts. Operate phototypesetter. Operate back-end system. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Produce hard-copy reader proof in an accurate and timely manner. Assume responsibility for decisions made while producing a hard-copy reader proof. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Series 300 Operator's Manual, Allied Linotype, 1985. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Submit typeset output for proofreading
PERFORMANCE STANDARD	Copy will be compared to customer job order and all errors will be identified by appropriate proofreader's marks.
STEPS	1. Remove hard-copy from the back-end device. 2. Place the copy in a folder along with the customer job order. 3. Mark the folder as to customer. 4. Send the folder to a proofreader. 5. Proofread with another proofreader who reads the customer copy while you read the hard-copy reader proof. 6. Identify all incorrect copy. 7. Mark each correction with appropriate proofreading symbol. 8. Identify needed correction in outside margin of copy. 9. Check copy for appearance and for agreement with job work order. Mark copy that is incorrectly done. 10. Return the proofread copy and customer copy in folder to typesetter for correction.
KNOWLEDGE	Proofread for correct use of words in copy. Proofread for correctness of content, spelling, format, grammar, punctuation and capitalization. Use dictionary or word division manual to locate correct spelling, division and hyphenation of words. Make corrections on copy using appropriate proofreader's symbols.
ATTITUDES	Proofread copy in an accurate and timely manner. Assume responsibility for decisions made while proofreading copy. Maintain good concentration and be willing to follow directions. Maintain confidentiality of information contained in copy. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock.

EQUIPMENT AND MATERIALS	Copy to be proofread Customer job order Reference books Dictionary Company style manual
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Read proofreader's marks and make indicated corrections in typeset copy
PERFORMANCE STANDARD	All errors marked with proofreader's marks must be corrected, and copy must be free of errors.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Obtain job order folder and hard copy with proofreader's marks. 2. Start typesetter or desktop publishing equipment and prepare for operation. 3. Insert customer diskette. 4. Review the hard copy to see what corrections need to be made. Depending on the corrections and the time available either: a. Compose the corrected words only or b. Insert customer diskette and make the corrections on the diskette. **Compose the corrected words.** (For digital and desktop systems, go to step 9.) 5. Tape the hard copy to a light table. 6. Cut out the corrected words with an artist's knife. 7. Apply hot beeswax to the backside of the corrected copy. 8. Position the corrections over the hard copy using a T-square and straightedge. Go to step 14. **Make corrections on diskette.** 9. Scroll the screen or use search procedures to locate copy to be changed. 10. Move the cursor to the position on the line where access points are to be changed. 11. Make character, word, line or paragraph changes. 12. Recalculate or rejustify line endings after editing is completed. 13. Print out a corrected copy. 14. Resubmit corrected copy to proofreader and customer for approval.
KNOWLEDGE	Read proofreader's marks. Make corrections on diskette.

KNOWLEDGE (Cont.)	Identify uses of special function keys. Identify different fonts. Operate typesetter or microcomputer. Use software application packages. Operate back-end system. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards.
ATTITUDES	Make corrections in typeset copy in an accurate and timely manner. Assume responsibility for decisions made while correcting typeset copy. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Read editor's marks and make indicated corrections in typeset copy

PERFORMANCE STANDARD All edited copy is redone and is free of errors.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Obtain edited copy.
2. Retrieve file containing disks or call up if on line.
3. Insert diskette and initialize the system according to the file.
4. Read editor's marks to see what corrections need to be made.
5. Scroll the screen or use search procedures to locate copy to be changed.
6. Move the cursor to the position on the line where access points are to be changed.
7. Make character, word, line or paragraph changes.
8. Recalculate or rejustify line endings after editing is completed.
9. Print out a corrected copy.
10. Resubmit corrected copy to proofreader and customer for approval.

KNOWLEDGE

Read editor's marks.
Make corrections on diskette.
Identify uses of special function keys.
Identify different fonts.
Operate typesetter or microcomputer.
Operate back-end system.
Interpret instructions and operator's manual.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Use software application packages.

ATTITUDES

Make corrections in phototypeset copy in an accurate and timely manner.
Assume responsibility for decisions made while correcting typeset copy.

SAFETY	In addition, refer to Employability Skills List. Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Correct grammar and spelling in typeset copy
PERFORMANCE STANDARD	All corrected copy is free of errors.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Call file to screen. 2. Move cursor to first correction. 3. Make correction. 4. Do the rest of the corrections. 5. Rejustify copy. 6. Print out corrected copy or send to photoprocessor. 7. Resubmit corrected copy to proofreader and customer for approval. 8. Compare corrected copy with the original customer copy.
KNOWLEDGE	Use dictionary or word division manual to determine correct spelling of words. Make corrections on diskette. Identify uses of special function keys. Identify different fonts. Operate typesetter or microcomputer. Operate back-end system. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Make corrections in phototypeset copy in an accurate and timely manner. Assume responsibility for decisions made while correcting typeset copy. In addition, refer to Employability Skills List.
SAFETY	Keep food or beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Correct typeset typographical errors
PERFORMANCE STANDARD	All corrected copy is free of errors.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Call file to screen. 2. Move cursor to first correction. 3. Make correction. 4. Do rest of corrections. 5. Rejustify copy. 6. Print out corrected copy or send to photoprocessor. 7. Resubmit corrected copy to proofreader and customer for approval. 8. Compare corrected copy with the original customer copy.
KNOWLEDGE	Use dictionary or word division manual to determine correct spelling of words. Make corrections on diskette. Identify uses of special function keys. Identify different fonts. Operate typesetter or microcomputer. Operate back-end system. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Make corrections in phototypeset copy in an accurate and timely manner. Assume responsibility for decisions made while correcting typeset copy. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Fit text and graphics to layout in phototypeset copy

PERFORMANCE STANDARD The text and graphics must fit the layout and meet customer approval.

STEPS NOTE: Order of steps may vary depending on equipment and software being used. (See task #038 for desktop and digital.)

1. Review job specifications on the work order.
2. Measure the length and depth of the layout.
3. Measure the length and depth of the typeset copy.
4. Set parameters for typesetter.
5. Change one of three things to make text fit.
   a. Line space.
   b. Line length.
   c. Type size.
6. Reduce or increase the graphics to fit the layout.
7. Send copy to customer for approval.

KNOWLEDGE

Identify uses of special function keys.
Identify different fonts.
Operate typesetter or microcomputer and desktop publisher.
Interpret instructions and operator's manual.
Visualize completed product.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.

ATTITUDES

Fit text and graphics to layout in an accurate and timely manner.
Assume responsibility for decisions made while fitting text and graphics to layout.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.
Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Phototypesetter Operator's manuals Fonts Copy Job ticket Diskettes
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Inspect and adjust phototypeset copy for density
PERFORMANCE STANDARD	The output must be free of gray, and the letters must be sharp.
STEPS	NOTE: This is not a task for digital typesetters. Periodically check density of digital typesetter with a densitometer. For phototypesetters, the order of steps may vary depending on the equipment and software being used. 1. Examine copy for blackness or grayness. If black, go to steps 2-5; if gray, go to steps 6-9. **If black, follow these steps:** 2. Examine letters with a magnifier to determine if the edges are fuzzy. If fuzzy, density is too high. 3. Open the filmstrip compartment and turn density setting knob one setting higher if copy is too light and one setting lower if the copy is too dark. 4. Print out the copy again and check the density. 5. Repeat steps 1-4 until the density is correct. **If gray, follow these steps:** 6. Change the chemicals and the heat setting in the processor. 7. Print out and examine copy again. If still gray, open the filmstrip compartment and turn the density setting knob one setting higher. 8. Print out copy and check again for grayness. 9. Repeat steps 7-8 until the gray is removed.
KNOWLEDGE	Interpret instructions and operator's manuals. Identify printer's terms. Interpret job specifications. Distinguish between acceptable and nonacceptable standards.
ATTITUDES	Assume responsibility for decisions made while determining and setting light intensity on phototypesetting equipment. In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Phototypesetter Job ticket or work order Operator's manuals Diskettes Fonts
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Mathematics: Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators. Goal 2-C: Application of ratios and proportions to real-life situations. Goal 2-E: Application of percents in real-life situations. Goal 3-B: Estimation of measurements. Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Inspect and adjust phototypeset copy for alignment
PERFORMANCE STANDARD	All copy is correctly aligned.
STEPS	NOTE: This is not a task for digital and desktop systems. For phototypesetters, do the following: 1. Lay a straightedge on the baseline of the typeset copy. If some letters are above or below the straightedge, copy is out of alignment. 2. Call the repair person if copy is out of alignment.
KNOWLEDGE	Distinguish between acceptable and nonacceptable standards. Use software application packages.
ATTITUDES	Inspect copy in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from typeset copy and equipment to avoid damage and electrical shock.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Straightedge Operator's manuals Phototypeset copy Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Inspect and adjust typeset copy for leadings and margins

PERFORMANCE STANDARD The text must fit the layout and meet customer approval.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review the job specifications on the work order.
2. Inspect the leadings and margins to see if they fit the layout.
3. Adjust the leadings, margins, line spacing, line length or type size to make the text fit the layout.
4. Proofread adjusted copy.
5. Send adjusted copy to customer for approval.

KNOWLEDGE

Identify uses of special function keys.
Identify different fonts.
Operate typesetter.
Interpret instructions and operator's manual.
Visualize completed product.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Use software application packages.
Locate and use the icons of the desktop system being used.
Open, copy and delete documents using the finder.
Scroll in a window or list box using the scroll bars and scroll box.
Change the size and position of windows using the size box and the title bar.
Pull down menus and choose commands.
Use the clipboard to store information.

ATTITUDES

Fit text and graphics to layout in an accurate and timely manner.
Inspect and adjust copy for leadings and margins in an accurate and timely manner.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Inspect and adjust typeset copy for type styles, family and size
PERFORMANCE STANDARD	The type styles, family and size of the copy must match the layout specifications and meet with customer approval.
STEPS	NOTE: Order of steps may vary depending on equipment and software being used. 1. Compare the typeset copy with the original marked-up copy. 2. Change any copy which does not match the original marked-up copy. 3. Proofread corrected copy. 4. Send corrected copy to customer for approval.
KNOWLEDGE	Identify uses of special function keys. Identify different fonts. Operate typesetter. Interpret instructions and operator's manual. Visualize completed product. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Operate desktop publishing equipment. Locate and use the icons of the desktop system being used. Open, copy and delete documents using the finder. Scroll in a window or list box using the scroll bars and scroll box. Change the size and position of windows using the size box and the title bar. Pull down menus and choose commands. Use the clipboard to store information. Use software application packages.
ATTITUDES	Inspect and adjust copy in an accurate and timely manner. Accept responsibility for decisions made while inspecting and adjusting copy for type styles, family and size. In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Update job file
PERFORMANCE STANDARD	All files which are no longer needed are deleted, and diskette is stored properly.
STEPS	1. Obtain list of files which are no longer needed from management. 2. Delete nonessential files from diskette. 3. Store diskette following company procedures.
KNOWLEDGE	Make corrections on diskette. Identify uses of special function keys. Identify different fonts. Operate typesetter. Operate back-end system. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Operate desktop publishing equipment. Use software application packages.
ATTITUDES	Accept responsibility for decisions made while updating job files. Update job files in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes Old job files Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Produce final typeset copy

PERFORMANCE STANDARD Final copy is free of errors and matches job work order.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Inspect layout for appearance.
2. Proofread.
3. Match layout against work order and original customer copy.
4. Send corrected copy to typesetter for final changes.
5. Make final changes.
6. Proofread.
7. Give final copy to customer for approval.
8. Send invoice to customer.

KNOWLEDGE

Format copy following company standards.
Follow procedures identified in equipment manual or software reference materials to create and name files.
Set margins for copy.
Format copy using software style sheet.
Format headers or footers.
Format enumeration.
Format long quotations.
Center lines.
Input copy using touch method of keyboarding.
Input copy to meet speed and accuracy standards set by company.
Change format while inputting copy.
Paginate or repaginate copy.
Follow procedures identified in equipment manual or software reference materials to run spelling check.
Input commands to print and store (save) copy.
Proofread printed copies for correctness of content, format, grammar, punctuation, capitalization and word divisions using proofreader's symbols.
Input corrections.
Follow procedures established by company for retaining copies.

KNOWLEDGE (Cont.)	Follow procedures established by company for labeling and filing magnetic media. Locate and use parts of typesetter or microcomputer. Identify uses of special function keys for specific software being used. Identify appropriate responses to messages or prompts on monitor. Log on or off typesetter or microcomputer. Identify computer terms. Use software application packages.
ATTITUDES	Prepare final copy in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from typesetter or desktop publishing equipment, diskette(s) and printed copies to avoid damage to equipment and diskette(s), electrical shock to operator or having to reprint copy. Remove excess paper from work area when job is completed. Keep magnetic media away from magnetic fields to avoid loss of stored (saved) work. Store (save) documents frequently to avoid loss of work due to power failure or power surge. Reduce eyestrain by using monitor with large screen and type size and by using antiglare screen. Observe safety warnings printed on specific equipment being used, such as "Keep fingers, hair, jewelry, etc., from this area."
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Job work order Reference books, such as dictionary, word division manual, punctuation guide and capitalization guide Software reference materials Company procedures manual Company style manual or general reference manual Operator's manuals Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Archive job file
PERFORMANCE STANDARD	All files which are no longer needed are deleted, and diskette is stored properly.
STEPS	1. Obtain list of files which are no longer needed from management. 2. Delete nonessential files from diskette. 3. Store diskette following company procedures.
KNOWLEDGE	Make deletions on diskette. Identify uses of special function keys. Identify different fonts. Operate typesetter. Interpret instructions and operator's manual. Interpret job specifications. Distinguish between acceptable and nonacceptable standards. Operate desktop publishing equipment.
ATTITUDES	Accept responsibility for decisions made while archiving job files. Archive job files in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Typesetter Microcomputer Operator's manuals Fonts Copy Job ticket Diskettes

EQUIPMENT AND MATERIALS (Cont.)	Old job files Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Merge text and graphics using software application packages
PERFORMANCE STANDARD	The text and graphics must fit the layout specifications and meet customer approval.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job specifications on the work order.
2. Ready equipment.
   a. Log on computer; or
   b. Turn on system and boot up program.
3. Select the proper mode of operation to use, such as composition, graphics, administration or modem.
4. Open the appropriate drawer or window in the system.
5. Create and name a folder or file for the customer, or retrieve customer file or folder, or insert customer diskette and pull up file.
6. Create a document or open up customer document.
7. Set page parameters, formats and fonts:
   a. Margins.
   b. Columns.
   c. Leadings.
   d. Word spacing.
   e. Hyphenation.
   f. Type format and style.
   g. Letter spacing.
8. Enter text via:
   a. Keyboard.
   b. Diskette. (Check to see if ASKII, DCA or PIC format and set equipment accordingly.)
   c. Optical scanner or From work station.
   d. Modem and communications system or network.
   e. Creation of compartments and importing from folder or file in system.
9. Place text.
10. Configure the looks of the text to layout specifications.
11. Enter graphics via:
    a. Keyboard.
    b. Diskette.

c. Optical scanner or cue from work station where graphic has been scanned, edited, scaled and touched up.

STEPS (CONT.)

d. Modem and communications system or network.
e. Importing from folder or file in system.

12. Place graphics by dragging to desired location; or link graphics with compartments; or create boxes, frames knockouts or squares within which to call in the graphic.
13. Crop out unwanted graphics.
14. Resize the graphics to fit the space and layout specifications.
15. Select text wraparound and flow commands if necessary.
16. Paginate and adjust text if necessary.
17. Add all heads, tints and borders.
18. Run spell check and make necessary corrections.
19. Print out reader proof.
20. Return proof to customer or supervisor for final proofing.
21. Make necessary changes in the document.
22. Print out second reader proof.
23. Return proof to customer or supervisor for final proofing.
24. Print out final copy.
25. Save and label the file.
26. Return final copy to customer in form and format specified on work order.

KNOWLEDGE

Identify uses of special function keys.
Operate computer, desktop publishing system and digital typesetter.
Interpret instructions and operator's manual.
Visualize completed product.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Locate and use the icons of the system being used.
Open, copy and delete documents using the finder.
Scroll in a window or list box using the scroll bars and scroll box.
Change the size and position of windows using the size box and the title bar.
Pull down menus and choose commands.
Use the clipboard to store information.
Use software application packages.

ATTITUDES

Merge text and graphics to layout in an accurate and timely manner.
Assume responsibility for decisions made while merging text and graphics to layout.
In addition, refer to Employability Skills List.

SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data. Maintain backup data files.
EQUIPMENT AND MATERIALS	Micro, mini or mainframe computer Digital typesetter Operator's manuals Copy Job ticket Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Complete a global search and edit or replace words and/or text

PERFORMANCE STANDARD The final document must be free of errors and match the customer copy and layout specifications.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review work order for changes.
2. Turn on equipment or log on to system.
3. Insert customer diskette or call up file.

For word changes, see steps 4-6 and 9-16.

4. Key in the words to be found and replaced or use mouse pointer and drag method.
5. Key in replacement words.
6. Hit the replace key or select replace icon.

For text changes, see steps 7-16.

7. Locate text to be changed by scrolling document or using global search procedures.
8. Key in or import changes.
9. Place a sidebar on document to show where changes were made.
10. Highlight or cross through replaced text.
11. Print out document.
12. Submit document to supervisor or customer to proof and review.
13. Make any necessary changes and delete sidebars and crossed-through replaced text.
14. Resize and repaginate text.
15. Print out text.
16. Submit copy to customer for review and approval.

KNOWLEDGE

Identify uses of special function keys.
Operate computer, desktop publishing system and digital typesetter.
Interpret instructions and operator's manual.
Visualize completed product.
Interpret job specifications.
Distinguish between acceptable and nonacceptable standards.
Locate and use the icons of the system being used.
Open, copy, add and delete items using different procedures.

KNOWLEDGE (Cont.)	Scroll in a window or list box using the scroll bars and scroll box. Change the size and position of windows. Pull down menus and choose commands. Use the clipboard to store information. Use software application packages.
ATTITUDES	Edit text and graphics to layout in an accurate and timely manner. Assume responsibility for decisions made while editing text and graphics. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data. Maintain backup data files.
EQUIPMENT AND MATERIALS	Micro, mini or mainframe computer Digital typesetter Operator's manuals Copy Job ticket Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Create structured graphics: flow charts, diagrams, graphs, technical drawings or organized charts

PERFORMANCE STANDARD Output must match the graphic layout specifications and meet customer approval.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review the job specifications on work order.
2. Ready equipment.
    a. Log onto computer; or
    b. Turn on system, boot up program and insert customer diskette.
3. Select the proper mode of operation.
4. Open customer file or create a document.
5. Set the page parameters, format and fonts.
6. Call up software to create structured graphics.
7. Create boxes, frames or squares and draw desired graphics or import graphics.
8. Adjust graphics to meet layout specifications.
9. Crop out unwanted graphics.
10. Resize the graphic to fit customer needs and layout specifications.
11. Add heads, tints and borders.
12. Print out reader proof of the graphics.
13. Return graphics to supervisor or to customer for proofing and/or changes.
14. Make necessary changes.
15. Print out second proof of the graphics.
16. Return proof to supervisor or customer for final approval.
17. Print out final copy.
18. Save and label the file.
19. Return final copy to customer in form and format specified on the work order.

KNOWLEDGE Identify uses of special function keys.
Operate computer, desktop publishing system and digital typesetter.
Interpret instructions and operator's manual.
Visualize completed product.

	Interpret job specifications.
KNOWLEDGE (Cont.)	Distinguish between acceptable and nonacceptable standards. Locate and use the icons of the system being used. Open, copy and delete documents using the finder. Scroll in a window or list box using the scroll bars and scroll box. Change the size and position of windows using the size box and the title bar. Pull down menus and choose commands. Use the clipboard to store information. Use software application packages.
ATTITUDES	Create graphics in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data. Maintain backup data files.
EQUIPMENT AND MATERIALS	Micro, mini or mainframe computer Digital typesetter Operator's manuals Copy Job ticket Laser printer Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read. Goal 3-E: Use of standard written English conventions. Goal 3-F: Ability to revise, edit and proofread.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Import text and graphics using optical scanner

PERFORMANCE STANDARD The resulting product must match the job layout specifications.

STEPS

NOTE: Order of steps may vary depending on equipment and software being used.

1. Review the work order.
2. Review customer text and graphics to be imported.
3. Power on the scanner or log on.
4. Program or teach the optical scanner to read the text and graphics.
5. Identify and label the parameters of the product to be read using cropping bars.
6. Select size of output desired.
7. Set tone control.

For text and graphics combined or for text without graphics, follow steps 8-12.

8. Place, feed or read the text and graphics into scanning equipment.
9. Read, verify and edit the scanned text and graphics.
10. Communicate the data to a media conversion unit.
11. Convert the media to form and format desired by customer.
12. Submit output to customer for approval.

For graphics without text, follow steps 13-16.

13. Scan graphics to work station so that it can be tailored to customer specifications.
14. Edit the graphics.
    a. Enlarge.
    b. Reduce.
    c. Scale.
    d. Perform touch-up work.
    e. Edit edges for better quality using pixel editing procedures.
15. Cue graphics from work station to composition station or convert to form desired by customer and return output to customer.
16. Merge graphics file with text.

KNOWLEDGE	Locate parts of optical scanning equipment. Identify uses of special function keys. Interpret instructions and operator's manuals. Interpret job specifications. Locate and use parts of a microcomputer. Use good mechanical proofreading skills.
ATTITUDES	Complete work in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data. Maintain a smoke-free and dust-free environment.
EQUIPMENT AND MATERIALS	Optical scanner Microcomputer Job ticket Customer work diskettes Work station Composition station
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION Compositor and/or Typesetter

DUTY AREA Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment

TASK Open, move, resize and close a window

PERFORMANCE STANDARD The windows can be opened, moved, resized, and closed according to operating manuals and without damage to equipment.

STEPS NOTE: Order of steps may vary depending on equipment and software being used.

1. Review job specifications on the work order.
2. Ready equipment.
   a. Turn on or log on computer.
   b. Insert diskette and/or call up customer file.
3. Select window.
4. Open the window using mouse and pointer or selecting command from menu.
5. Select resize or move command.
   a. Resize a window using mouse or menu command.
   b. Move a window using a mouse or menu command.
6. Close a window using a mouse or menu command.

KNOWLEDGE

Pull down menus and choose commands.
Change the size and position of windows using the size box and the title bar.
Identify and use software applications terms, such as click, double-click, drag, shift-click, dialog, box, list box, folder, button and alert box.
Locate and use the icons of the desktop system being used.

ATTITUDES

Complete task in an accurate and timely manner.
In addition, refer to Employability Skills List.

SAFETY

Keep food and beverages away from equipment to avoid damage and electrical shock.
Keep magnetic media away from magnetic fields to avoid loss of data.

EQUIPMENT AND MATERIALS	Desktop publishing system Digital typesetter Microcomputer Laser printer Operator's mauals Job ticket Desktop publishing software package
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

TASK ANALYSIS

OCCUPATION	Compositor and/or Typesetter
DUTY AREA	Programming and Setting up Phototypesetting, Digital and Desktop Publishing Equipment
TASK	Backup the system
PERFORMANCE STANDARD	All copy on the backed-up system must be the same as the original copy.
STEPS	1. Place tape in tape drive or diskette in disk drive. 2. Select icon or enter codes to backup the system. 3. Copy all data from the system onto tape or diskette. 4. Label the tape or diskette. 5. File the tape or diskette.
KNOWLEDGE	Identify uses of special function keys. Operate computer and desktop publishing system. Interpret instructions and operator's manuals. Follow procedures established by company or manufacturer for backing up the system. Input commands to save copy. Log on or off computer.
ATTITUDES	Backup the system in an accurate and timely manner. In addition, refer to Employability Skills List.
SAFETY	Keep food and beverages away from equipment to avoid damage and electrical shock. Keep magnetic media away from magnetic fields to avoid loss of data.
EQUIPMENT AND MATERIALS	Micro, mini or mainframe computer Desktop publishing Operator's manuals Copy Diskettes or tape
SOURCE OF ANALYSIS	Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall and summarization of material read.

IL88CD04 019099

Education
For
Employment
Task Lists

Illinois
State Board of
Education

Adult
Vocational and
Technical Education

1988

TASK ANALYSIS

FOR

INDUSTRIAL OCCUPATIONS

CLUSTER: **ELECTRONIC OCCUPATIONS**
OCCUPATION: **COMPUTER REPAIR TECHNICIAN**
Duty Area: Servicing Computer Equipment

BEST COPY AVAILABLE

ICBVE
"KEY TO EFFECTIVE LEARNING"

Illinois Competency Based Vocational
Education Project
Housed At: Lake County Area
Vocational Center
19525 West Washington Street
Grayslake, IL 60030-1194
(312) 223-6681 or 620-8770

Tasks Analyzed by CBVE Industrial Occupations Consultant	Dave Dimmlich
CBVE Project Director	Urban T. Oen, Ph.D.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Interpret computer troubleshooting charts

PERFORMANCE STANDARD Probable cause of problem and type of tests to run to check problem must be based on symptom and/or customer complaint and verified by interpretation of computer troubleshooting charts.

STEPS

1. Obtain explanation of problem or symptom.
2. Read and interpret work order to identify problem.
3. Verify the problem or symptom.
4. Locate the problem/symptom/complaint on the computer troubleshooting flowchart.
5. Determine the probable cause on the computer troubleshooting flowchart.
6. Determine diagnostic tests to run to check the problem.
7. Run appropriate diagnostic tests.
8. Narrow down probable cause to one faulty section using systematic procedure, troubleshooting flowchart and necessary tests.
9. Locate faulty component using systematic procedure, troubleshooting flowchart and necessary tests.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Determine probable cause of problem using troubleshooting flowcharts, block diagrams and schematics.
Use technical references to identify specifications for electronic devices.
Define technical terms associated with electronic troubleshooting.
Explain the operating principles and functions of computer systems.
Identify and demonstrate the procedure for locating faulty computer components.
Identify, select and run diagnostic tests.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Test equipment
Computer system
Electronic technician's tool kit
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 67.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Social Sciences:

- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-C: Costs and benefits of a particular course of action.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.
- Goal 3-B: Basic scientific standards and research abilities which include:
  1. accuracy, skill and safe practices in laboratory activities;
  2. application of an operational definition using terms to physically describe the activity or result of a procedure;
  3. good experimental techniques which will be evident by the precision practiced during the investigation;
  4. systematization of data to maintain an orderly manner of review;
  5. effectiveness in communicating laboratory procedures and results;
  6. ability to analyze, evaluate or replicate the experimental work of others.
- Goal 4-A: Observation.
- Goal 4-B: Classification.
- Goal 4-C: Inference.
- Goal 4-D: Prediction.
- Goal 4-E: Measurement.
- Goal 4-F: Communication.
- Goal 4-G: Data collection, organization and interpretation.
- Goal 4-H: Operational definition development.
- Goal 4-I: Question and hypothesis formulation.
- Goal 4-J: Experimentation.
- Goal 4-K: Model formulation.
- Goal 4-L: Results verification.
- Goal 4-M: Scientific equipment use.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 1-A: Ability to read, write and name numbers in several different ways.
Goal 1-B: Ability to perform operations with numbers with and without a calculator.
Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
Goal 1-D: Ordering numbers.
Goal 1-E: Application of properties of numbers and operations.
Goal 1-F: Use of exponents, powers, and roots.
Goal 1-G: Use of factors and multiples.
Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
Goal 1-I: Use of number patterns.
Goal 2-C: Application of ratios and proportions to real-life situations.
Goal 2-E: Application of percents in real-life situations.
Goal 3-A: Measurement in various contexts using appropriate units.
Goal 3-D: Conversion of units within one system and from one system to another.
Goal 3-E: Application of selected measurement systems, instruments, and techniques.
Goal 4-A: Use of expressions, equations, or inequalities to describe general patterns.
Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
Goal 4-F: Ability to perform operations with algebraic expressions.
Goal 4-G: Interpretation of functions and their graphs.
Goal 6-A: Interpretation of data from an experiment.
Goal 6-B: Ability to estimate probabilities from experiments or from data.
Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
Goal 7-F: Appropriate application of words of quantification.
Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Interpret chip-swapping charts

PERFORMANCE STANDARD Integrated circuit chip must be identified using a chip-swapping chart according to manufacturer's logo, core number and batch code found on chip.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the integrated circuit chip.
4. Locate and remove the integrated circuit chip which is malfunctioning following procedures covered in the analysis of tasks 720-S-046-CRT, 720-S-049-CRT, 720-S-052-CRT, 720-S-056-CRT, 720-S-064-CRT and 720-S-065-CRT refer to these tasks for information on integrated circuit chips.
5. Interpret integrated circuit chip information using chip-swapping chart to identify core code number:
    a. Logic family.
    b. Logic subfamily.
    c. Function of integrated circuit chip.
    d. Prefix-manufacturer, integrated circuit type.
    e. Suffix-package type, temperature range.
    f. Other.
6. Interpret integrated circuit chip information using chip-swapping chart to identify batch code:
    a. Year of manufacture.
    b. Production batch.
    c. Other.
7. Interpret integrated circuit chip information using chip-swapping chart to identify the manufacturer's logo and related information.
8. Match codes and number with chip-swapping chart and determine replacement integrated circuit chip.

KNOWLEDGE Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with chip-swapping charts.
Define technical terms associated with troubleshooting and repairing electronic devices.

KNOWLEDGE (Cont.)

Identify and demonstrate the procedure for troubleshooting and repairing a computer using chip-swapping charts.
Use technical references to identify specifications for integrated circuit chips.
Interpret integrated circuit chip data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Chip-swapping charts
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement integrated circuit chips

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objectives 68 & 134.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Interpret computer schematics

PERFORMANCE STANDARD Computer schematics must be interpreted to locate parts or circuits that are interrelated, and faulty components must be located by monitoring circuits using schematics and test equipment.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problems.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Use schematic to locate parts and circuits which may be the probable cause of the problems.
5. Run diagnostic tests to isolate the faulty parts and circuits.

KNOWLEDGE

Identify standard analog and digital electronic symbols.
Identify standard symbols used on schematics.
Define technical terms associated with schematics.
Interpret flowcharts, block diagrams and schematics.
Explain the operating principles and functions of test equipment.
Explain and demonstrate the procedures for calibrating test equipment.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and demonstrate the procedure to fault isolate a malfunctioning circuit and component using a schematic and diagnostic tests.
Describe static handling procedures.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 69.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-C: Costs and benefits of a particular course of action.
- Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Biological and Physical Sciences:

Goal 1-C: Fundamental units used to express the structure of nature.

Goal 1-D: How two or more things interact and the effect each has on the other.

Goal 1-F: Characteristics of energy and matter.

Goal 1-H: Influence of a field on objects within its domain.

Goal 1-I: Cause and effect relationships which allow predictions to be made.

Goal 3-B: Basic scientific standards and research abilities which include:

1. accuracy, skill and safe practices in laboratory activities;
2. application of an operational definition using terms to physically describe the activity or result of a procedure;
3. good experimental techniques which will be evident by the precision practiced during the investigation;
4. systematization of data to maintain an orderly manner of review;
5. effectiveness in communicating laboratory procedures and results;
6. ability to analyze, evaluate or replicate the experimental work of others.

Mathematics:

Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-A: Use of expressions, equations, or inequalities to describe general patterns.

Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 4-F: Ability to perform operations with algebraic expressions.

Goal 4-G: Interpretation of functions and their graphs.

Goal 6-A: Interpretation of data from an experiment.

Goal 6-B: Ability to estimate probabilities from experiments or from data.

Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-F: Appropriate application of words of quantification.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Interpret manufacturing upgrade
PERFORMANCE STANDARD	Upgrade information will determine service to be performed. Upgrades may include manufacturing changes, problems identified in the field, and/or safety changes.
STEPS	1. Read and interpret upgrade information to determine type of service to be performed. 2. Use technical references to identify specifications for upgrade to be performed. 3. Read and interpret flowcharts, block diagrams and schematics to determine upgrade procedure. 4. List changes to equipment in sequential order. 5. Update service and technical manuals with upgrade information and specifications. 6. Determine necessary customer services related to compatability of existing archive files and/or working data files, software compatability, new commands and/or procedures, hardware and peripheral device compatability and operation of equipment after upgrade. 7. Determine warranty/service responsibility. 8. Identify and contact customers affected by upgrade. 9. Perform necessary hardware upgrade. 10. Perform necessary software upgrade. 11. Perform necessary diagnostic tests and adjustments. 12. Explain hardware upgrade to customer. 13. Explain software upgrade, file compatability and file conversion to customer. 14. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.
KNOWLEDGE	Read and interpret upgrade information. Interpret flowcharts, block diagrams and schematics. Use technical references to identify specifications for electronic devices. Use service manuals to determine procedures for servicing electronic devices. Identify customer-related services.

KNOWLEDGE (Cont.)	Define technical terms associated with hardware and software upgrades. Explain the functions of upgrades. Identify and demonstrate the procedure for interpreting manufacturing upgrades. Identify, select and run diagnostic tests. Identify and demonstrate the procedure for updating service manuals and technical references. Determine the compatability of the upgrade with existing system hardware and peripheral devices. Determine the compatability of the upgrade with existing software and data files. Explain the necessary conversion procedures used for upgrading software and data files. Read and interpret warranty and service documents.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Upgrade replacement parts Upgrade information
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 70. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Remove and install computer cover

PERFORMANCE STANDARD Computer cover must be removed to allow access to internal components of the unit. All cables, wiring harness, shields and filters when reconnected must meet all manufacturer's specifications.

STEPS

1. Turn power off.
2. Disconnect power cable and other peripheral cables.

CAUTION: Failure to disconnect the power cable may result in electrical shock and injury. Always disconnect the power cable before removing the computer cover.

3. Use service manuals to determine the procedure for removing the computer cover.
4. Locate fasteners holding cover to housing.
5. Remove fasteners holding cover to housing.
6. Remove cover partially and disconnect wires or cables connected to both cover and housing if necessary.
7. Mark or diagram position of wires and cables if necessary.
8. Replace cover partially and reconnect wires or cables to both cover and housing if necessary.
9. Place cover back on housing and replace fasteners.
10. Reconnect power cable and other peripheral cables.

KNOWLEDGE

Use service manuals to determine the procedure for removing and replacing the computer cover.
Define technical terms associated with computer covers, wiring harnesses, shields and filters.
Explain the operating principles and functions of computer covers, wiring harness, shields and filters.
Identify and demonstrate the procedure for removing and replacing computer covers.
Identify the types of fasteners and the procedure for their removal and replacement.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.
Disconnect the power cable before removing the computer cover to avoid electrical shock and injury.

EQUIPMENT AND MATERIALS

Block diagrams and schematics
Technical references
Service manuals
Computer system
Electronic technician's tool kit

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 71.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install computer keyboard

PERFORMANCE STANDARD Keyboard must be functional and must pass diagnostic test without error.

STEPS

1. Determine type of keyboard and method by which keyboard is connected to computer:
    a. Integral keyboard with solder connection, go to step #2.
    b. Integral keyboard plug type, go to step #11.
    b. Separate keyboard plug type, go to step #22.

IF KEYBOARD IS THE INTEGRAL TYPE WITH SOLDER CONNECTION, FOLLOW THESE STEPS:

2. Disconnect power cord.
3. Remove cover.
4. Remove fasteners and solder connections joining keyboard to housing.
5. Remove keyboard from housing.
6. Replace keyboard in housing.
7. Replace all fasteners and solder all necessary connections.
8. Replace cover.
9. Reconnect power cord.
10. Run diagnostic tests to verify keyboard operation.

IF KEYBOARD IS THE INTEGRAL TYPE WITH PLUG-IN CONNECTORS, FOLLOW THESE STEPS:

11. Disconnect power cord.
12. Remove cover.
13. Remove fasteners holding keyboard to housing.
14. Unplug keyboard.
15. Remove keyboard from housing.
16. Replace keyboard in housing.
17. Plug in keyboard.
18. Replace all fasteners holding keyboard to housing.
19. Replace cover.
20. Reconnect power cord.
21. Run diagnostic tests to verify keyboard operation.

STEPS (Cont.)

IF KEYBOARD IS THE SEPARATE PLUG-IN TYPE, FOLLOW THESE STEPS:

22. Unplug keyboard from main housing.
23. Plug new keyboard into main housing.
24. Run diagnostic tests to verify keyboard operation.

KNOWLEDGE

Use technical references to identify specifications for keyboards and keyboard plug types.
Define technical terms associated with keyboards and keyboard plug types.
Explain the operating principles and functions of keyboards and keyboard plug types.
Identify the types of keyboard plugs, ribbon wiring types and the procedure for removing and replacing keyboards.
Identify and demonstrate the procedure for soldering and removing solder from electrial connections.
Identify, select and run keyboard diagnostic tests.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Technical references
Service manuals
Replacement keyboard
Test equipment
Computer system
Electronic technician's tool kit

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 72.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install motherboard in computer
PERFORMANCE STANDARD	Motherboard must be functional and must pass diagnostic test without error.
STEPS	1. Read and interpret work order, block diagrams and schematics to identify work to be performed. 2. Disconnect power cord and peripheral cords. 3. Remove cover. CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas. 4. Remove plug-in cards from motherboard and note slots from which they were removed if necessary. 5. Disconnect power supply from motherboard. 6. Disconnect speaker. 7. Disconnect other necessary connections. 8. Remove motherboard-retaining fasteners. 9. Unhook motherboard from any support flanges. 10. Lift motherboard up and out. 11. Place new motherboard back on support flanges. 12. Replace motherboard-retaining fasteners. 13. Connect speaker. 14. Connect power supply to motherboard. 15. Connect other necessary connections. 16. Replace plug-in cards in slots on motherboard from which they were removed. 17. Replace cover. 18. Connect power cord and peripheral cords. 19. Identify, select and run diagnostic tests to verify motherboard operation.
KNOWLEDGE	Interpret work orders, block diagrams and schematics. Use service manuals to determine procedures for servicing electronic devices. Use technical references to identify specifications for electronic devices. Define technical terms associated with computer motherboards. Explain the operating principles and functions of the computer motherboard.

KNOWLEDGE (Cont.)

Identify the types of computer motherboards and the procedure for removing and replacing them.
Identify the types of wiring, plugs and connectors.
Identify, select and run diagnostic tests.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Replacement motherboard

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 73.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-F: Use of exponents, powers, and roots.
- Goal 1-G: Use of factors and multiples.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-A: Measurement in various contexts using appropriate units.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install power supply in computer

PERFORMANCE STANDARD Power supply must be installed in computer to manufacturer's specifications. The computer must power-up when the power switch is turned on.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate power supply and move any cables or ties to gain access to the power supply.
5. Loosen the retaining screws or nuts.
   NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove the power supply.
6. Remove the power supply from the housing.
7. Disconnect the power supply cables.
8. Inspect new power supply to verify that it meets all specifications.
9. Connect the new power supply cable.
10. Place new power supply in the housing and check to be sure that the mounting brackets match.
11. Replace all retaining screws or nuts.
    NOTE: Do not overtighten or force screws or nuts, or the threads may strip.
12. Replace any cables or ties which were moved to gain access to the power supply.
13. Connect power cord and check new power supply for correct voltage.
14. Replace cover.
15. Replace all other peripheral cables.
16. Power up the computer and run diagnostic checks.
17. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Identify the types of power supplies used in computer equipment.
Identify the types of wiring, plugs and connectors used with computer power supplies.
Identify the types of mounting methods, devices, slides and fasteners used with computer power supplies.
Explain the operating principles and functions of computer power supplies.
Interpret flowcharts, block diagrams and schematics.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Define technical terms associated with computer power supplies.
Identify and demonstrate the procedure for removing and replacing a computer power supply.
Identify, select and run diagnostic tests.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Power supply

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 74.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install analog board in computer

PERFORMANCE STANDARD Analog board must be functional and must pass a diagnostic test without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Remove disk drive assembly shield.
   NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace an analog board.
5. Disconnect disk drive ribbon cable.
6. Disconnect read/write head cable.
7. Remove mounting screws holding analog board to housing.
8. Remove analog board from retaining hooks.
9. Disconnect motor control board plug.
10. Inspect new board to verify that it meets all specifications.
11. Connect motor control board plug to new analog board.
12. Install new analog board in housing.
13. Replace mounting screws.
    NOTE: Do not overtighten or force screws or nuts, or the threads may strip.
14. Replace read/write head cable.
15. Replace disk drive ribbon cable.
16. Replace disk drive assembly shield.
17. Replace computer cover.
18. Reconnect power cord and other peripheral cables.
19. Select and run diagnostic tests to verify operation of new analog board.
20. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics. Use service manuals to determine procedures for servicing electronic devices. Use technical references to identify specifications for electronic devices. Define technical terms associated with analog boards and disk drives. Explain the operating principles and functions of analog boards and disk drives. Identify and demonstrate the procedure for removing and replacing analog boards. Identify the types of analog boards and disk drives. Identify, select and run diagnostic tests. Identify the types of wiring, plugs and connectors. Monitor ramped and stepped wave forms with an oscilloscope. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Analog board
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 75. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-C: Use of specific information or reasons to support and elaborate the main point.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-A: Use of expressions, equations, or inequalities to describe general patterns.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-G: Interpretation of functions and their graphs.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install disk drive assembly in computer

PERFORMANCE STANDARD Disk drive assembly must be functional and must pass diagnostic tests without errors.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Remove analog card if necessary. (See Task 009)
   NOTE: Computers vary. Consult the manufacturer's manual for the specific types of disk drives and procedure to follow to install disk drives.
5. Remove disk drive access cover and bay cover if necessary.
6. Disconnect and label cables from disk drive.
7. Remove fasteners holding old drive in housing.
8. Remove old drive.
9. Inspect new disk drive to verify that it meets specifications.
10. Install new disk drive.
11. Align front panel bezel and drive unit.
12. Replace fasteners and tighten unit in place.
    NOTE: Do not overtighten or force screws or nuts or the threads may strip.
13. Connect all cables to new drive.
14. Replace access cover if necessary.
15. Replace analog card if necessary.
16. Replace computer cover.
17. Connect power cord and other peripheral cables.
18. Run diagnostic tests to verify operation of the new disk drive.
19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Define technical terms associated with disk drives.
Explain the operating principles and functions of disk drives.
Explain the compatability of disk drives with processors and with various versions of DOS.
Identify and demonstrate the procedure for removing and replacing disk drives.
Identify the types and parts of disk drives.
Identify, select and run diagnostic tests.
Identify the types of wiring, plugs and connectors used with disk drives.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Disk drive

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 76.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-C: Use of specific information or reasons to support and elaborate the main point.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:

- Goal 5-C: Costs and benefits of a particular course of action.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install main logic assembly in computer

PERFORMANCE STANDARD Main logic assembly must be installed to manufacturer's specifications. All leads, connectors and peripheral cards must be properly installed; and the unit must pass all diagnostic tests.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Loosen fasteners, disconnect and label all cables and remove all peripheral cards from slots on main board. NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and install the main logic assembly.
5. Loosen fasteners holding main logic board to housing.
6. Locate, label and remove all cables connected to main logic board.
7. Prepare a nonstatic area to set main logic board and other boards.
8. Lift out main logic assembly.
9. Remove encoder board.
10. Remove memory board.
11. Remove mounting hardware from main logic assembly.
12. Remove main logic assembly from housing.

CAUTION: Keep main logic board from shorting on access panel. Position or hold insulating shield in place.

13. Inspect new main logic assembly to verify that it meets specifications.
14. Install new main logic assembly in housing.
15. Install encoder board on logic board.
16. Install memory board on logic board.
17. Set memory boundaries and other necessary DIP-switches and HEX rotary switches on main logic assembly.
18. Check and set all DIP-switches, and HEX rotary switches on all peripheral cards.
19. Replace all cables connected to the main logic board.

STEPS (Cont.)

20. Tighten fasteners holding main logic board to housing. NOTE: Do not overtighten or force screws or nuts, or the threads may strip.
21. Replace all peripheral cards in slots on main board.
22. Reroute all cables and tie in place.
23. Replace computer cover.
24. Connect power cord and other peripheral cables.
25. Run diagnostic tests to verify operation of the new main logic assembly.
26. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Identify, describe the function of and locate dedicated and nondedicated peripheral card slots.
Identify configuration switch positions on main logic board and on peripheral cards.
Explain the operating principles and functions of DIP and HEX switches.
Describe static-handling procedures.
Explain the operating principles and functions of the main logic assembly.
Explain the operating principles and functions of memory maps, boundaries and their settings.
Interpret flowcharts, block diagrams and schematics.
Use technical references to identify specifications for electronic devices.
Define technical terms associated with main logic boards.
Identify, select and run diagnostic tests on main logic boards.
Identify the types of wiring, plugs and connectors used with main logic boards.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Main logic assembly

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 77.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install integrated circuit chips in computer
PERFORMANCE STANDARD	Integrated circuit chips must be installed according to manufacturer's specifications. The replaced chips must pass all diagnostic tests error free.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Identify the chip to be replaced and remove the board on which it is located from the computer.
   NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove the necessary board.
5. Determine the method used to mount the chip to the board:
   a. Nonsoldered (press-in type).
   b. Soldered.
6. Note the chip location, orientation and other information.
7. Look up the chip identifying code in a chip-swapping chart and get a replacement chip.

IF THE CHIP IS IN A NONSOLDERED CIRCUIT, FOLLOW THESE STEPS:

8. Insert tip of integrated circuit chip puller under the ends of the chip and gently lift the chip straight up.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

9. Remove new chip from protective package.
10. Inspect new integrated circuit chip to verify that it meets specifications.
11. Place new chip in chip inserter making sure that the pins are straight.

CAUTION: If the pins are not straight, the chip may not fit in the socket holes. This may damage the chip or cause a poor connection which will cause the chip to fail.

STEPS
(Cont.)

12. Align and insert one row of pins on chip into socket holes.

CAUTION: Integrated circuit chips are designed to fit in the socket holes a specific way. It is important that pin number one is matched to socket number one. Consult the manufacturer's technical manual for specific information on the chip being used.

13. Align and insert the second row of pins on the chip into socket holes.
14. Check to verify that all pins are located in the appropriate socket holes.
15. Gently press the chip into the socket holes until the chip is seated level and flush.
16. Go to step #33.

IF THE CHIP IS IN A SOLDERED CIRCUIT FOLLOW THESE STEPS:

17. Heat a pin on the integrated circuit chip until the solder at the base of the pin melts.
18. Remove melted solder with solder wick, bulb or pump.
19. Grip the pin with a pair of needle nose pliers and gently move the pin until it breakes free.
20. Repeat steps 19-21 until all pins on the chip are free.
21. Insert tips of integrated circuit chip puller under the ends of the chip and gently lift the chip straight up.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

22. Clean the back of the circuit board with flux remover.

CAUTION: Do not use an aerosol-type flux remover on boards populated with MOS/CMOS integrated circuits as this may damage the circuit.

23. Remove new chip from protective package.
24. Inspect new integrated circuit chip to verify that it meets specifications and that the connectors are the correct type.
25. Place new chip in chip inserter making sure that the pins are straight.

CAUTION: If the pins are not straight, the chip may not fit in the socket holes. This may damage the chip or cause a poor connection which will cause the chip to fail.

26. Align and insert one row of pins on chip into socket holes.

CAUTION: Integrated circuit chips are designed to fit in the socket holes a specific way. It is important that pin number one is matched to socket number one. Consult the manufacturer's technical manual for specific information on the chip being used.

27. Align and insert the second row of pins on the chip into socket holes.
28. Check to verify that all pins are located in the appropriate socket holes.
29. Gently press the chip into the socket holes until it is seated level and flush.
30. Solder each pin individually.

STEPS
(Cont.)

31. Inspect each solder joint for bridges and other defects and correct if necessary.
32. Inspect all foil traces for defects.

FOR BOTH TYPES OF CIRCUITS, FOLLOW THESE STEPS:

33. Replace computer cover.
34. Connect power cord and other peripheral cables.
35. Run diagnostic tests to verify operation of the new integrated circuit chip.
36. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Describe static-handling procedures.
Use service manuals to determine procedures for removing and replacing chips.
Use technical references to identify specifications for electronic devices.
Use chip-swapping charts to identify compatible chips.
Identify and demonstrate the procedure for soldering and desoldering chips.
Identify and demonstrate the procedure for removing and replacing chips.
Define technical terms associated with soldering.
Define technical terms associated with integrated circuit chips.
Identify the types of integrated circuit chips.
Explain the operating principles and functions of integrated circuit chips.
Identify, select and run diagnostic tests.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Integrated circuit chip Chip puller Chip inserter
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 78. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 1-F: Integration of information from more than one text. Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences. Goal 3-E: Use of standard written English conventions. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns. Social Sciences: Goal 5-B: Sources of information evaluated in terms of selective criteria. Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install power light in computer
PERFORMANCE STANDARD	Power indicator light must light up when power is turned on.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate power indicator light and move any cables or ties which are in the way of the power indicator light.
5. Remove power light cap.
6. Remove power light shield if necessary.
7. Remove power light bulb.
8. Check power light socket for corrosion and wear.
9. Inspect power light terminals and wires for corrosion and wear.
10. Clean or replace power light socket and wires if necessary.
11. Inspect power light mounting hardware for tightness and tighten if necessary.
12. Read and interpret code or marking data on bulb or determine replacement using manufacturer's manual.
13. Select replacement power light bulb.
14. Inspect replacement power light bulb to verify that it meets specifications and that the base style is correct.
15. Seat replacement power light bulb in socket.
16. Replace power light shield if necessary.
17. Replace power light cap.
18. Replace any cables or ties which were moved to gain access to the power light.
19. Replace computer cover.
20. Connect power cord and other peripheral cables.
21. Complete all necessary reports and paperwork noting parts used, labor time spent and other required information.

KNOWLEDGE	Identify the types of wiring, plugs, lamp base types and connectors used with computer and peripheral indicator lights. Identify the types of lights used in computers and peripheral devices. Identify and demonstrate the procedure for removing and replacing computer power indicator lights. Interpret lamp data and charts. Define technical terms associated with computer indicator lights. Use technical references to identify specifications for electronic devices.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Light bulb Lamp chart
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 79. Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install on-off switch in computer

PERFORMANCE STANDARD On-off switch must be functional and equipment must power up when switch is in the on position.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate on-off switch and move any cables, ties or assemblies necessary to gain access to the on-off switch.
5. Remove retaining screws from switch panel.
6. Disconnect leads from switch or board.
7. Unlatch switch retaining hardware and remove switch.
8. Check switch connectors, leads, terminals and wires for corrosion and wear.
9. Clean or replace switch connectors, leads, terminals and wires if necessary.
10. Inspect switch latch and mounting hardware for serviceability and adjust or replace if necessary.
11. Read and interpret code or marking data on switch or determine replacement using manufacturer's manual.
12. Select replacement switch.
13. Inspect new switch to verify that it meets specifications.
14. Seat new switch in place and latch retaining hardware.
15. Connect leads to switch or board.
16. Check switch for on-off orientation and adjust if necessary.
17. Replace retaining screws in switch panel.
18. Replace any cables, ties or assemblies moved to gain access to switch.
19. Replace computer cover.
20. Connect power cord and other peripheral cables.
21. Power up system and check that switch orientation is correct, power light is illuminated and fuses held load.

KNOWLEDGE	Identify the types of wiring, plugs and connectors used with computer and peripheral switches. Identify the types of switches used in computers and peripheral devices. Identify and demonstrate the procedure for removing and replacing switches. Interpret switch data, charts and technical information. Define technical terms associated with switches. Use technical references to identify specifications for electronic devices. Explain the operating principles and functions of computer and peripheral switches.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Switch Switch charts
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 80. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-D: Ordering numbers.
- Goal 1-I: Use of number patterns.
- Goal 3-D: Conversion of units within one system and from one system to another.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install main printed circuit board in computer
PERFORMANCE STANDARD	Main printed circuit board must be functional and system must power up and pass diagnostic tests.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate main circuit board and label all cables connected to the board or necessary to gain access to the board.
5. Note and label the orientation on all connectors which are not keyed.
6. Unplug all cables connected to the main circuit board.
7. Remove all peripheral boards necessary to gain access to the main circuit board.
   NOTE: Computers vary consult the manufacturer's manual for the necessary boards to remove and specific procedure to follow to remove peripheral boards.
8. Disconnect the ground wire from the main circuit board.
9. Remove main circuit board fasteners from housing.
10. Remove main circuit board from housing.
11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
13. Read and interpret code or marking data on main printed circuit board or determine replacement using manufacturer's manual.
14. Select replacement main circuit board.
15. Inspect new main circuit board to verify that it meets specifications.
16. Insert new main circuit board in housing and replace fasteners.
17. Reconnect ground wire to main circuit board.
18. Replace all peripheral boards.
19. Reconnect, route and tie all cables.
20. Replace computer cover.
21. Connect power cord and other peripheral cables.

STEPS
(Cont.)

22. Run diagnostic tests to verify operation of the new main printed circuit board.
23. Complete all necessary reports and paperwork noting parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Explain the operating principles and functions of the main printed circuit board.
Identify and demonstrate the procedure for removing and replacing the main circuit board.
Identify the types of wiring, plugs, sockets, terminals and connectors used with computer and peripheral devices.
Define technical terms associated with main printed circuit boards.
Describe static-handling procedures.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

- Troubleshooting flowcharts
- Block diagrams and schematics
- Technical references
- Service manuals
- Test equipment
- Computer system
- Electronic technician's tool kit
- Diagnostic disk
- Main printed circuit board

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 81.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-G: Interpretation of functions and their graphs.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install power supply printed circuit board in computer

PERFORMANCE STANDARD Power supply circuit board must be functional and system must power up.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.

CAUTION: Lethal voltage is present in power supply circuit board when the AC power cord is connected.

3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate power supply circuit board and label all cables connected to the board or necessary to gain access to the board.
5. Note and label the orientation on all connectors which are not keyed.
6. Unplug all cables connected to the power supply circuit board.
7. Remove fasteners holding power supply board to housing.
8. Remove power supply board from housing.
9. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
10. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
11. Read and interpret code or marking data on power supply circuit board or determine replacement using manufacturer's manual.
12. Select replacement power supply circuit board.
13. Inspect new power supply circuit board to verify that it meets specifications.
14. Insert new power supply circuit board in housing and replace fasteners.
15. Reconnect, route and tie all cables.
16. Replace computer cover.
17. Connect power cord and other peripheral cables.
18. Run diagnostic tests to verify operation of the new power supply circuit board.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Describe pin-outs of power supply connector socket.
Determine the location of voltage adjustment resistors, resistor identification numbers and order of adjustment.
Identify the types of power supplies and circuit boards used in computers and peripheral devices.
Explain the operating principles and functions of power supplies and power supply circuit boards.
Identify the types of wiring, plugs and connectors used with computer and peripheral power supplies.
Define technical terms associated with power supplies.
Describe static-handling procedures.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Power supply printed circuit board

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair,
Performance Objective 82.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install drive motor
PERFORMANCE STANDARD	Drive motor must run when powered up.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate drive motor and move any cables, ties or assemblies necessary to gain access to the drive. NOTE: Equipment varies. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the drive motor.
5. Disconnect necessary interface cables.
6. Remove any covers or assemblies necessary to gain access to the drive motor.
7. Loosen drive belt adjusting nut and relieve tension from belt.
8. Remove drive belt from motor pulley.
9. Remove motor mounting screws.
10. Disconnect wires from brush mountings on motor.
11. Lift drive motor from motor mount.
12. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
13. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
14. Read and interpret code or marking data on drive motor or determine replacement using manufacturer's manual.
15. Select replacement drive motor.
16. Inspect new drive motor to verify that it meets specifications.
17. Place new drive motor on motor mounts and replace fasteners.
18. Connect wires to brush mountings on motor.
19. Inspect drive belt for wear and replace if necessary.
20. Place drive belt on motor pulley and tighten adjusting screw to adjust belt to proper tension.
21. Adjust belt tracking.

STEPS
(Cont.)

22. Replace all assemblies removed to gain access to drive motor.
23. Connect necessary interface cables.
24. Replace computer cover.
25. Connect power cord and other peripheral cables.
26. Run diagnostic tests to verify operation of the new drive motor.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Describe the reasons and procedure for adjusting drive belt tracking and tension.
Explain the operating principles and functions of the drive motor.
Identify the types of wiring, plugs and connectors used with computer and peripheral drive motors.
Identify the types of drive motors used in computers and peripheral devices.
Define technical terms associated with drive motors.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement drive motor
Replacement drive belt

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 83.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Social Sciences:
  - Goal 5-B: Sources of information evaluated in terms of selective criteria.
  - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
  - Goal 1-C: Fundamental units used to express the structure of nature.
  - Goal 1-F: Characteristics of energy and matter.
- Mathematics:
  - Goal 1-A: Ability to read, write and name numbers in several different ways.
  - Goal 1-B: Ability to perform operations with numbers with and without a calculator.
  - Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
  - Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
  - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  - Goal 4-G: Interpretation of functions and their graphs.
  - Goal 6-A: Interpretation of data from an experiment.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install print hammer

PERFORMANCE STANDARD Print hammer must be functional and must print clear characters.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and peripheral cable.
3. Remove printer cover.
   NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to gain access to and replace the print hammer.
4. Remove ribbon cartridge.
5. Remove print hammer.
6. Read and interpret code or marking data on print hammer or determine replacement using manufacturer's manual.
7. Select replacement print hammer.
8. Inspect new print hammer to verify that it meets specifications.
9. Install new print hammer.
10. Adjust print hammer to manufacturer's specifications.
11. Replace ribbon cartridge.
12. Replace printer cover.
13. Connect power cord and peripheral cable.
14. Run printer tests to verify operation of the new print hammer.

KNOWLEDGE

Explain the operating principles and functions of the print hammer.
Define technical terms associated with print hammers and printers.
Identify the types of print hammers used in printers.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify and describe the function of print hammers.
Read and interpret printer block diagrams.
Explain the functions of printer controls.
Identify, select and run printer diagnostic tests.
Interpret printer diagnostic test results.

KNOWLEDGE (Cont.)

Describe print commands, paper movement and special printer functions.
Describe the relationship of line buffer output, character generator, control timing and write pulses to the print head.
Identify and demonstrate the procedure for removing and replacing the printer ribbon cartridge.
Identify and apply the problem solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Electronic technician's tool kit
Printer
Replacement print hammer

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 84.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install print mechanism

PERFORMANCE STANDARD Print mechanism (dot matrix head, print ball or thimble, or daisy wheel) must be changed to correct lettering problems or to change the type style to be printed.

STEPS

1. Power down printer.
2. Remove cover.
3. Remove ribbon cartridge.
4. Determine type of print mechanism:
    a. Dot matrix head.
    b. Ball or thimble.
    c. Daisy wheel.
5. Remove print mechanism from carrier:
    a. Dot matrix heads usually have retaining screws.
    b. Balls or thimbles usually have a retaining latch.
    c. Daisy wheels usually snap into position.
    NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the print mechanism.
6. Read and interpret code or marking data on print mechanism or determine replacement type style using manufacturer's manual.
7. Select replacement print mechanism.
8. Inspect new print mechanism to verify that it meets specifications.
9. Replace print mechanism.
10. Replace ribbon cartridge.
11. Replace cover.
12. Power up printer and print diagnostic test to verify print type and quality.

KNOWLEDGE

Explain the operating principles and functions of the print mechanism.
Define technical terms associated with print mechanisms and printers.
Identify the types of print mechanisms used in printers.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.

KNOWLEDGE (Cont.)	Identify and describe the function of the print mechanism. Read and interpret printer block diagrams. Explain the functions of printer controls. Identify, select and run printer diagnostic tests. Interpret printer diagnostic test results. Describe print commands, paper movement and special printer functions. Identify and demonstrate the procedure for removing and replacing the printer ribbon cartridge. Recognize print problems caused by defective print mechanism. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Electronic technician's tool kit Printer Replacement print mechanism
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 85. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install carriage assembly
PERFORMANCE STANDARD	Carriage assembly must be functional.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and peripheral cable.
   NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the carriage assembly.
3. Remove cover.
4. Remove ribbon cartridge.
5. Remove print head.
6. Remove platen.
7. Mark the position, orientation and routing of cables and remove them.
8. Unplug encoder printed circuit board from main printed circuit board.
   NOTE: Encoder printed circuit board is an important part of the carriage assembly, and a new one will be provided with the new carriage assembly.
9. Loosen ribbon shield retaining screws and remove shields.
10. Loosen drive belt adjusting nut to relieve belt tension and remove belt from clutch/motor assembly and carriage assembly.
11. Loosen rear guide shaft locking plate screws, slide rear guide shaft through mounting slots and pull the carriage assembly off the grooved front bearing.
12. Slide the rear guide shaft out of the carriage assembly.
13. Disconnect harness cable from the side of the printer case.
14. Remove carriage assembly from printer.
15. Read and interpret code or marking data on carriage assembly or determine replacement using manufacturer's manual.
16. Select replacement carriage assembly.
17. Inspect new carriage assembly to verify that it meets specifications.
18. Slide rear guide shaft into new carriage assembly.
19. Slide the carriage assembly into grooved front bearing.

STEPS (Cont.)

20. Replace the rear shaft locking plates and tighten the screws.
21. Replace drive belts and tighten belt adjusting nut.
22. Align and tighten motor/clutch hardware to manufacturer's specifications.
23. Replace harness cable and move carriage assembly back and forth to make sure it runs free.
24. Connect the new encoder printed circuit board into main printed circuit board.
25. Replace the platen, print head, ribbon shield, cradle and ribbon cartridge.
26. Adjust drive belt tension.
27. Replace the mechanical assembly screw on the bottom of the printer.
28. Replace cover.
29. Connect power cord and other peripheral cables.
30. Connect printer to computer.
31. Run diagnostic tests to verify operation of the new carriage assembly.

KNOWLEDGE

Explain the operating principles and functions of the carriage assembly.
Define technical terms associated with carriage assemblies and printers.
Identify the types of carriage assemblies used in printers.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify and describe the function of carriage assemblies.
Identify and describe the function of encoder boards.
Read and interpret printer block diagrams.
Explain the functions of printer controls.
Identify, select and run printer diagnostic tests.
Interpret printer diagnostic test results.
Identify and demonstrate the procedure for removing and replacing the printer ribbon cartridge.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

- Troubleshooting flowcharts
- Block diagrams and schematics
- Technical references
- Service manuals
- Test equipment
- Computer system
- Electronic technician's tool kit
- Diagnostic disk
- Printer
- Carriage assembly

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 86.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install paper feed assembly

PERFORMANCE STANDARD Paper feed assembly must feed paper through the printer according to manufacturer's specifications.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and peripheral cable.
3. Remove printer cover.
   NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the paper feed assembly.
4. Remove drive rod retainers.
5. Remove paper feed assembly.
6. Remove tractor feed mechanism from drive rod.
7. Remove platen and drive belt.
8. Check gears and belts for missing cogs or excessive wear.
9. Check drive rod for wear.
10. Replace worn or damaged parts or entire unit if necessary.
11. Replace platen and drive belt.
12. Replace drive rod in tractor feed mechanism.
13. Replace paper feed assembly in housing.
14. Replace drive rod retainers.
15. Replace printer cover.
16. Connect power cord and peripheral cable.
17. Load paper into printer.
18. Run printer diagnostic tests to verify operation of the new paper feed assembly.

KNOWLEDGE

Explain the operating principles and functions of the paper feed assembly.

Define technical terms associated with paper feed assemblies and printers.

Identify the types of paper feed assemblies used in printers.

Use service manuals to determine procedures for servicing paper feed assemblies.

Use technical references to identify specifications for paper feed assemblies.

KNOWLEDGE (Cont.)	Identify and describe the function of paper feed assembly components. Read and interpret printer block diagrams. Identify, select and run printer diagnostic tests. Interpret printer diagnostic test results. Describe print commands, paper movement and special printer functions. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Printer Paper feed assembly
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 87. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  - Goal 1-F: Integration of information from more than one text.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Social Sciences:
  - Goal 5-B: Sources of information evaluated in terms of selective criteria.
  - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
  - Goal 1-D: How two or more things interact and the effect each has on the other.
  - Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Mathematics:
  - Goal 1-A: Ability to read, write and name numbers in several different ways.
  - Goal 1-B: Ability to perform operations with numbers with and without a calculator.
  - Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install drive indicator light

PERFORMANCE STANDARD Drive indicator light must light up when disk drive is in operation.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate disk drive and move any cables, ties or assemblies necessary to gain access to the disk drive. NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the disk drive indicator light.
5. Remove disk drive cover.
6. Identify the type of light to be replaced.
7. Remove drive indicator light.
8. Read and interpret code or marking data on bulb or determine replacement using manufacturer's manual.
9. Select replacement bulb.
10. Inspect new drive indicator bulb to verify that it meets specifications.
11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
13. Install new disk drive indicator light.
14. Replace disk drive cover.
15. Replace any cables, ties or assemblies moved to gain access to the disk drive.
16. Replace computer cover.
17. Connect power cord and other peripheral cables.
18. Run test of disk drive to verify operation of the new disk drive indicator light.

KNOWLEDGE	Explain the operating principles and functions of disk drives and indicator lights. Identify and demonstrate the procedure for removing and replacing the various types of indicator lights. Identify the types of indicator lights used in computers and peripheral devices. Identify the types of wiring, plugs and connectors used with computer and peripheral indicator lights. Interpret flowcharts, block diagrams and schematics. Identify, select and run diagnostic tests. Interpret diagnostic test results. Use service manuals to determine procedures for servicing disk drive indicator lights. Use technical references to identify specifications for light bulbs. Interpret light bulb data, charts and technical information. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement bulb Bulb reference charts or manuals
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 88. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install peripheral connection cables
PERFORMANCE STANDARD	Peripheral connection cables between peripheral equipment and the main central processing unit must be functional, allowing the equipment to function as one unit.
STEPS	1. Determine type of cable connection necessary. 2. Identify correct port on main processing unit. 3. Select cable to connect peripheral device to main processing unit. 4. Check cable orientation and connect cable to peripheral device. 5. Check cable orientation and connect cable to main processing unit. 6. Run diagnostic tests to verify operation of the cable connection.
KNOWLEDGE	Explain the operating principles and functions of connection cables. Explain the operating principles and functions of the different types of ports. Identify the types of wiring, plugs and connectors used with computer and peripheral connections. Define technical terms associated with connection cables. Identify the types of cables and ports used in computers and peripheral devices. Identify, select and run diagnostic tests. Interpret diagnostic test results. Use technical references to identify specifications for peripheral connection ports.
ATTITUDES	Work without the need for close supervision. Complete assignments accurately and on time. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Peripheral device
Cables

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 89.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install peripheral connections
PERFORMANCE STANDARD	Worn or damaged peripheral cable connection port must be exchanged so that peripheral cable connectors fit snugly and provide a good connection with the port.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate connection port to be replaced and move any cables, ties or assemblies necessary to gain access to the connection port.
   NOTE: Connection ports vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the port.
5. Determine the method by which the port is connected to the main processing unit:
   a. Plug-in connection.
   b. Solder connection.

IF THE PORT IS THE PLUG-IN TYPE, FOLLOW THESE STEPS:

6. Remove board to which the port is mounted.
7. Grasp connection port firmly on outer edges and unplug it from the board.
8. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
9. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
10. Read and interpret code or marking data on port or determine replacement using manufacturer's manual.
11. Select replacement port.
12. Inspect new connection port to verify that it meets specifications.
13. Check orientation of port and insert new port into place by gently pushing port into socket.

STEPS (Cont.)

IF THE PORT HAS A SOLDER CONNECTION, FOLLOW THESE STEPS:
14. Remove board to which the port is mounted.
15. Desolder the connection and remove the melted solder with a solder sucker or wick.
16. Once all solder is removed, gently move the connector to insure that it is free and remove the port from the board.
17. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
18. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
19. Read and interpret code or marking data on port or determine replacement using manufacturer's manual.
20. Select replacement port.
21. Inspect new connection port to verify that it meets specifications and that the connectors are correct.
22. Check orientation of port and align it in position.
23. Resolder connections.
24. Check solder connections.

FOR BOTH TYPES OF CONNECTIONS, FOLLOW THESE STEPS:
25. Replace computer cover.
26. Connect power cord and other peripheral cables.
27. Run diagnostic tests to verify operation of the new connection port.

KNOWLEDGE

Explain the operating principles and functions of the different types of peripheral connection ports.
Identify the types of ports used in computers and peripheral devices.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Define technical terms associated with peripheral connection ports.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use technical references to identify specifications for peripheral connection ports.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Peripheral connection port

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 90.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION: Computer Repair Technician

DUTY AREA: Servicing Computer Equipment

TASK: Install circuit/language cards

PERFORMANCE STANDARD: Circuit/language card must be changed to correct a programming/operation problem or to change the language.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate circuit/language card, mark and move any cables or ties which are in the way of the card.
   NOTE: Computers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the circuit/language card.
5. Mark and remove any cables attached to the card.
6. Grasp the upper edges of the card and gently pull it out of its socket.
7. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
8. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
9. Read and interpret code or marking data on card or determine replacement using manufacturer's manual.
10. Select replacement circuit/language card.
11. Inspect new circuit/language card to verify that it meets specifications.
12. Insert new circuit/language card into the socket and gently press on the upper outer edges of the card to seat it in the socket.
13. Reconnect cables to the card.
14. Replace computer cover.
15. Connect power cord and other peripheral cables.
16. Run diagnostic tests to verify operation of the new circuit/language card.

KNOWLEDGE

Explain the operating principles and functions of a circuit/language card.
Define technical terms associated with circuit/language cards.
Identify the types of circuit/language cards used in computers.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use service manuals to determine procedures for servicing circuit/language cards.
Use technical references to identify specifications for circuit/language cards.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement circuit/language card

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 91.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install modem coupler

PERFORMANCE STANDARD Modem must function and allow information to be sent and received via a telephone line.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Determine type of modem:
   a. Internal.
   b. External plug in.
   c. External acoustic.

IF THE MODEM IS THE INTERNAL TYPE, FOLLOW THESE STEPS:

3. Disconnect power cord.
4. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

5. Locate empty slot on motherboard.
   NOTE: Computers vary consult the manufacturer's manual for the specific slot to use to install the modem.
6. Set DIP switches on modem and motherboard if necessary.
7. Insert modem in slot.
8. Replace cover.
9. Connect power cord.
10. Connect telephone jack to modem.
11. Power up computer, load and run modem self-test and run software for control of modem.

IF THE MODEM IS THE EXTERNAL PLUG-IN TYPE, FOLLOW THESE STEPS:

12. Locate serial port on computer.
13. Check plug orientation and plug connection cable into modem and computer.
14. Connect telephone jack to modem .
15. Power up computer and modem, and conduct self-test to verify operation of modem.
16. Load and run software for control of modem.

STEPS (Cont.)

IF THE MODEM IS THE EXTERNAL ACOUSTIC TYPE FOLLOW THESE STEPS:

17. Locate serial port on computer.
18. Check plug orientation and plug connection cable into modem and computer.
19. Power up computer and modem, and conduct self-test to verify operation of modem.
20. Place telephone receiver on modem pads.
21. Load and run software for control of modem.

KNOWLEDGE

Explain the operating principles and functions of a modem.
Identify the types of modems used with computers.
Define technical terms associated with modems.
Identify the types of wiring, plugs and connectors used with modems.
Identify and demonstrate the procedure for conducting modem self-tests.
Identify and demonstrate the procedure for communicating with other computers using a modem.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use technical references to identify specifications for modems.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Modem Telephone line
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 92. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 2-A: Meaning of spoken messages. Goal 2-F: Effective and appropriate responses. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Social Sciences: Goal 5-B: Sources of information evaluated in terms of selective criteria. Goal 5-I: Roles of the individual in the world of work. Biological and Physical Sciences: Goal 1-D: How two or more things interact and the effect each has on the other. Goal 1-I: Cause and effect relationships which allow predictions to be made. Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install tape transport assembly

PERFORMANCE STANDARD Tape transport assembly must be functional and pass all diagnostic tests.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate tape transport assembly and move any cables or ties which are in the way of the assembly.
5. Remove tape transport assembly retaining screws.
6. Remove tape transport assembly from housing.
7. Read and interpret code or marking data on tape transport assembly or determine replacement using manufacturer's manual.
8. Select replacement tape transport assembly.
9. Inspect new tape transport assembly to verify that it meets specifications.
10. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
11. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
12. Replace tape transport assembly in housing and replace retaining screws.
13. Replace computer cover.
14. Connect power cord and other peripheral cables.
15. Run diagnostic tests to verify operation of the new tape transport assembly.

KNOWLEDGE	Explain the operating principles and functions of tape transport assemblies. Identify the types of tape transport assemblies used in computers. Define technical terms associated with tape transport assemblies. Use service manuals to determine procedures for servicing tape transport assemblies. Use technical references to identify specifications for tape transport assemblies. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement tape transport assembly
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 93. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install read/write/verify head
PERFORMANCE STANDARD	Tape drive read/write/verify head must function to store, recall and verify data.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Locate tape transport assembly and move any cables, ties or assemblies necessary to gain access to the assembly.
5. Remove retaining screws and lift tape transport assembly from housing.
6. Remove head retaining screws and lift head from assembly.
7. Mark and disconnect lead wires from head.
8. Remove head from assembly.
9. Read and interpret code or marking data on read/write/verify head or determine replacement using manufacturer's manual.
10. Select replacement read/write/verify head.
11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
13. Inspect new read/write/verify head to confirm that it meets specifications.
14. Connect lead wires to head.
15. Place head on tape transport assembly and replace retaining screws.
16. Place tape transport assembly in housing and replace retaining screws.
17. Replace any cables, ties or assemblies moved to gain access to the tape transport assembly.
18. Replace computer cover.
19. Connect power cord and other peripheral cables.
20. Run diagnostic tests to verify operation of the new read/write/verify head.

KNOWLEDGE

Explain the operating principles and functions of the read/write/verify head.
Identify the types of read/write/verify heads used in computers.
Define technical terms associated with read/write/verify heads.
Interpret flowcharts, block diagrams and schematics.
Use service manuals to determine procedures for servicing read/write/verify heads.
Use technical references to identify specifications for read/write/verify heads.
Interpret read/write/verify head data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement read/write/verify head

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 94.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-B: Ability to solve simple equations and inequalities and interpret the solutions.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 7-F: Appropriate application of words of quantification.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install modem set switch

PERFORMANCE STANDARD External modem set switch must be installed to enable the half duplex and full duplex modes to be used.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord, peripheral cable and telephone line.
3. Remove cover.
4. Mark lead wires and disconnect them from the set switch.
5. Remove set switch retaining screws and remove switch from modem.
6. Read and interpret code or marking data on switch or determine replacement using manufacturer's manual.
7. Select replacement modem set switch.
8. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
9. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
10. Inspect new modem set switch to verify that it meets specifications.
11. Connect lead wires to switch.
12. Replace switch in modem and replace retaining screws.
13. Replace modem cover.
14. Reconnect modem to power source, computer and telephone line.
15. Power up system and run diagnostic tests to verify operation of the new switch.

KNOWLEDGE

Explain the operating principles and functions of a modem.
Explain the half duplex and duplex operating modes of a modem.
Identify the types of set switches used in modems.
Define technical terms associated with modems.
Identify and demonstrate the procedure for conducting modem self-tests.
Identify and demonstrate the procedure for communicating with other computers in half duplex and duplex modes.
Use technical references to identify specifications for modems and set switches.

KNOWLEDGE (Cont.)	Use service manuals to determine procedures for servicing electronic devices. Interpret switch data, charts and technical information. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement switch Modem
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 95. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-D: Ordering numbers.
- Goal 1-I: Use of number patterns.
- Goal 3-D: Conversion of units within one system and from one system to another.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install ribbon assembly

PERFORMANCE STANDARD Installed printer ribbon must produce dark, clear and readable print.

STEPS

1. Turn printer off.
2. Open dust cover to gain access to the ribbon cartridge. NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to change the ribbon.
3. Manually move the print head to the middle of the platen if necessary.

CAUTION: The power must be off when moving the print head. Moving the print head with the power on may damage your printer. If you have been using your printer prior to changing the ribbon, the print head will be hot and could cause burns.

4. Follow the manufacturer's procedure to remove the old ribbon cartridge.
5. Read and interpret code or marking data on ribbon cartridge, or determine replacement using manufacturer's manual.
6. Select replacement ribbon cartridge.
7. Tighten the replacement ribbon by turning the small knob on the top of the cartridge in the direction of the arrow.
8. Align the ribbon cartridge, lower it into position until it seats and lock it in place.
9. Guide the ribbon into place between the ribbon guide and the print head if necessary.
10. Tighten the ribbon.
11. Close the dust cover.
12. Turn printer on and run diagnostic tests to verify operation of the new ribbon cartridge.

KNOWLEDGE

Explain the operating principles and functions of printer ribbon cartridges.

Define technical terms associated with printer ribbons.

Identify the types of ribbons and cartridges used in printers.

KNOWLEDGE (Cont.)	Use technical references to identify specifications for printer ribbons and cartridges. Use service manuals to determine procedures for changing printer ribbons. Interpret printer ribbon data, charts and technical information. Identify, select and run diagnostic tests. Interpret diagnostic test results.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Technical references Service manuals Printer Replacement ribbon
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 96. Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-D: Ordering numbers.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install drive belts
PERFORMANCE STANDARD	Installed drive belt must operate according to manufacturer's specifications.
STEPS	1. Power down system and remove cover. 2. Loosen belt tension adjustment to release the tension from the belt. 3. Remove the belt from the drive pulley or gears. 4. Read and interpret code or marking data on drive belt, or determine replacement using manufacturer's manual. 5. Select replacement drive belt. 6. Place new belt on drive pulley or gears and make sure that it is properly aligned and seated. 7. Adjust the belt tension using belt tension adjustment screw. 8. Turn drive belt by hand to check for belt binding or slippage. 9. Replace cover. 10. Power up system and run diagnostic tests to verify operation of the new drive belt.
KNOWLEDGE	Explain the operating principles and functions of drive belts. Define technical terms associated with drive belts. Identify the types of drive belts used in computers and peripheral devices. Use service manuals to determine procedures for replacing drive belts. Use technical references to identify specifications for drive belts. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions.

ATTITUDES (Cont.)

Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Peripheral device
Replacement drive belt

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 97.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
    Goal 1-A: Recognition, recall, and summarization of material read.
    Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
Physical Development and Health:
    Goal 3-A: Safe and appropriate use of equipment in physical activities.
    Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
Social Sciences:
    Goal 5-B: Sources of information evaluated in terms of selective criteria.
    Goal 5-I: Roles of the individual in the world of work.
Mathematics:
    Goal 1-A: Ability to read, write and name numbers in several different ways.
    Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
    Goal 3-A: Measurement in various contexts using appropriate units.
    Goal 3-D: Conversion of units within one system and from one system to another.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install AC input connections
PERFORMANCE STANDARD	Defective AC connection or cord must be replaced, and the system must power up.

STEPS

1. Power down system and disconnect AC power cord from power source.
2. Inspect AC power cord for defects.
3. Remove cover.
4. Inspect AC power connection for defects.
5. Determine cause of problem:
   a. AC power cord.
   b. AC power connection.

IF THE PROBLEM IS IN THE AC POWER CORD, FOLLOW STEPS 6-18:

6. Determine how the AC power cord is connected to the equipment:
   a. Plug-in connection.
   b. Soldered connection.

IF THE CORD IS THE PLUG-IN TYPE, FOLLOW STEPS 7-10.

7. Grasp cord near the socket and pull straight out. NOTE: Avoid wiggling the plug if possible as this may loosen the socket connection or break off pins.
8. Select replacement cord.
9. Align plug with socket and plug in new cord.
10. Power up system to verify operation.

IF THE CORD IS THE SOLDERED TYPE, FOLLOW STEPS 11-18.

11. Desolder AC power cord leads from internal connection.
12. Remove AC power cord from internal connection.
13. Select replacement cord.
14. Run new cord through opening in cover if necessary.
15. Solder new cord to internal connection.
16. Route new cord through opening in cover if necessary.
17. Replace cover.
18. Power up system to verify operation.

STEPS (Cont.)

IF THE PROBLEM IS IN THE AC POWER CONNECTION, FOLLOW STEPS 19-26.

19. Remove AC power cord following one of the methods above.
20. Desolder AC power connector from board.
21. Remove AC power connector from board.
22. Select replacement AC power connector.
23. Solder new connector to board.
24. Replace AC power cord following one of the methods above.
25. Replace cover.
26. Power up system to verify operation.

KNOWLEDGE

Identify the types of AC power cords and connections used in computers and peripheral devices.
Explain the functions of AC power cords and connections.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Define technical terms associated with AC power cords and connections.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Technical references
Service manuals
Computer system
Electronic technician's tool kit
Replacement AC power cord or connection

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 98.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install fuse holders and fuses

PERFORMANCE STANDARD Fuse and fuse holder must be installed so equipment will not receive a power current overload and equipment will power up.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Push in on fuse cap while turning cap counterclockwise until it is free.
4. Remove fuse.
5. Check fuse for melted or broken center connector and cracked or discolored glass.
6. Check end connection of fuse holder for corroded or loose connections.
7. Remove equipment cover, if fuse holder is cracked, chipped or broken.
8. Remove retaining clip from back of fuse holder.
9. Remove fuse holder from case.
10. Read and interpret code or marking data on fuse and fuse holder, or determine replacement using manufacturer's manual.
11. Select replacement fuse and fuse holder.
12. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
13. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
14. Inspect new fuse and fuse holder to verify that they meet specifications.
15. Insert new holder into position and replace retaining clip.
16. Replace cover.
17. Insert new fuse into holder and replace cap.
18. Connect power cord and other peripheral cables.
19. Run diagnostic tests to verify operation of the new fuse and fuse holder.

KNOWLEDGE

Identify the types of fuses and fuse holders used in computers and peripheral devices.
Explain the operating principles and functions of fuses.
Define technical terms associated with fuses.
Use technical references to identify specifications for fuses.
Use service manuals to determine procedures for servicing electronic devices.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement fuse and fuse holder

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 99.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install ejector mechanisms
PERFORMANCE STANDARD	Disk must eject when disk drive door is opened.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Remove analog card if necessary. (See Task 009.)
   NOTE: Computers vary. Consult the manufacturer's manual for the specific types of disk drives and procedure to follow to install disk drives.
5. Remove disk drive access cover and bay cover.
6. Disconnect and label cables from disk drive.
7. Remove fasteners holding drive in housing.
8. Remove drive from housing.
9. Check when disk is inserted into the drive, that the ejector block is pushed back and locks into hole in retainer spring.
10. Remove and replace ejector block if cracked or broken pieces are found.
11. Replace retainer spring if bent or broken.
12. Check that release spring on door latch releases retainer spring when door is open.
13. Replace retainer spring if necessary.
14. Check that ejector block return spring compresses when block is pushed in and pushes forward when released.
15. Replace return spring if necessary.
16. Replace disk drive in housing.
17. Align front panel bezel and drive unit.
18. Replace fasteners and tighten unit in place.
19. Connect all cables to new drive.
20. Replace access cover if necessary.
21. Replace analog card if necessary.
22. Replace computer cover.
23. Connect power cord and other peripheral cables.
24. Run diagnostic tests to verify operation of the new disk drive.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics. Use service manuals to determine procedures for servicing electronic devices. Use technical references to identify specifications for electronic devices. Define technical terms associated with disk drives. Explain the operating principles and functions of disk drive ejector mechanisms. Identify and demonstrate the procedure for removing and replacing disk drives. Identify and demonstrate the procedure for repairing disk drive ejector mechanisms. Identify the types and parts of disk drives and ejector mechanisms. Identify, select and run diagnostic tests. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Disk drive replacement parts
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 100. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING	Language Arts:

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:

- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:

- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-D: Ordering numbers.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install cathode ray tube
PERFORMANCE STANDARD	Monitor must power up and display a functional screen.

STEPS

1. Power down monitor and disconnect AC power cord and peripheral cables.
2. Remove the monitor case.
3. Discharge high voltage from the flyback transformer and disconnect the lead.

CAUTION: Up to 15,000 volts can be stored in the flyback transformer; take extreme care and follow all safety precautions when working with monitors. Computers and monitors vary. Consult the manufacturer's manual for the specific procedure to follow for proper discharging and service.

4. Disconnect and remove video driver board.
5. Remove yoke clamp screw and remove yoke clamp.
6. Remove ring magnet and deflection yoke.
7. Remove cathode ray tube retaining screws and carefully remove cathode ray tube.
8. Read and interpret code or marking data on tube, or determine replacement using manufacturer's manual.
9. Select replacement cathode ray tube.
10. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
11. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
12. Place new cathode ray tube on mounts and replace retaining screws.
13. Reconnect ring magnet and deflection yoke.
14. Replace yoke clamp.
15. Replace and reconnect video driver board.
16. Reconnect flyback transformer lead.
17. Replace monitor case.
18. Connect AC power cord and peripheral cables.
19. Power up computer and run diagnostic tests to verify operation of the new cathode ray tube.

KNOWLEDGE

Explain the operating principles and functions of monitors and cathode ray tubes.
Identify and demonstrate the procedure for removing and replacing a cathode ray tube.
Define technical terms associated with monitors.
Interpret flowcharts, block diagrams and schematics.
Describe methods and safety precautions for discharging transformers.
Use service manuals to determine procedures for removing and replacing cathode ray tubes.
Use technical references to identify specifications for electronic devices.
Interpret cathode ray tube data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.
Follow safety precautions when discharging flyback transformer.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement cathode ray tube

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 101.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-H: Influence of a field on objects within its domain.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install configuration switches
PERFORMANCE STANDARD	Configuration switches must enable the printer to operate according to host system specifications.

STEPS

1. Power down printer and disconnect AC power cord and peripheral cables.
2. Remove printer cover.
3. Remove configuration switch retaining screws.
4. Mark wires and cables connected to the switch and remove them.
5. Remove configuration switch from housing.
6. Read and interpret code or marking data on switch, or determine replacement using manufacturer's manual.
7. Select replacement configuration switch.
8. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
9. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
10. Align and position new configuration switch on mount.
11. Reconnect wires and cables to the switch.
12. Replace retaining screws.
13. Set configuration switch according to system specifications.
14. Replace printer cover.
15. Connect AC power cord and peripheral cables.
16. Power up system.
17. Run diagnostic tests to verify operation of the new printer configuration switch.

KNOWLEDGE

Explain the operating principles and functions of configuration switches.
Define technical terms associated with configuration switches.
Identify the types of configuration switches used in computers and peripheral devices.
Use service manuals to determine procedures for removing and replacing configuration switches.
Use technical references to identify specifications for electronic devices.
Identify, select and run diagnostic tests.

KNOWLEDGE (Cont.)

Interpret diagnostic test results.
Interpret switch data, charts and technical information.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement configuration switch

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, *Computer Equipment Repair*, Performance Objective 102.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install peripheral controls

PERFORMANCE STANDARD Peripheral control must provide control between central processing unit and peripheral equipment.

STEPS

1. Power down system.
2. Remove peripheral cables between central processing unit, peripheral control unit and peripheral device.
3. Remove peripheral control unit.
4. Select replacement peripheral control unit.
5. Inspect new peripheral control unit to verify that it meets specifications.
6. Connect cables between central processing unit and peripheral control unit.
7. Connect cables between peripheral control unit and peripheral devices.
8. Power up system and run diagnostic tests to verify operation of the new peripheral control unit.

KNOWLEDGE

Identify the types of peripheral control units.
Explain the operating principles and functions of peripheral device control units.
Define technical terms associated with peripheral device control units.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.

ATTITUDES (Cont.)

Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement peripheral control unit

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 103.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install data communications adapter

PERFORMANCE STANDARD Data communications adapter must enable data communication equipment to operate in conjunction with system.

STEPS

1. Power down system.
2. Determine type of adapter needed to connect data communication equipment to the system:
   a. Pin adapter.
   b. Card-edge adapter.
   c. Jack/plug adapter.
3. Connect adapter to system and data communication equipment.
4. Power up system and run diagnostic tests to verify operation of the new data communication adapter.

KNOWLEDGE

Explain the operating principles and functions of data communication adapters.
Define technical terms associated with data communication adapters.
Identify the types of wiring, plugs and connectors used with data communication adapters.
Identify the types of data communication adapters.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Data communications adapter

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 104.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
  Goal 1-A: Recognition, recall, and summarization of material read.
  Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
Physical Development and Health:
  Goal 3-A: Safe and appropriate use of equipment in physical activities.
  Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
Social Sciences:
  Goal 5-B: Sources of information evaluated in terms of selective criteria.
  Goal 5-I: Roles of the individual in the world of work.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install expansion memory
PERFORMANCE STANDARD	Expanded memory must pass diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Determine type of memory expansion to be made:
   a. ROM - Read Only Memory.
   b. RAM - Random Access Memory.
5. Determine type, speed and size of memory chips necessary using manufacturer's manual.
6. Look up the chip identification code in a chip-swapping chart.
7. Select replacement memory chips.
8. Note chip location, orientation and other information.
9. Determine design of memory expansion the system uses:
   a. Chips added to motherboard.
   b. Memory expansion board.
10. Determine the method used to mount the chip to the board:
    a. Nonsoldered (press-in type).
    b. Soldered.
    NOTE: Refer to the analysis for Task 720-S-012-CR for the procedure to remove and replace both types of chips.

IF CHIPS ARE ADDED TO THE MOTHERBOARD, FOLLOW THESE STEPS:

11. Determine location and orientation for installing expansion memory chips using schematic memory map.
12. Install memory chips on motherboard.

CAUTION: Integrated circuit chips are designed to fit in the socket holes a specific way. It is important that pin number one is matched to socket number one. Consult the manufacturer's technical manual for specific information on the chip being used.

STEPS
(Cont)

13. Set configuration switches on motherboard to include added memory.
14. Replace computer cover.
15. Connect power cord and other peripheral cables.
16. Run RAM and ROM diagnostic tests to verify operation of the expansion memory.

IF CHIPS ARE ADDED TO AN EXPANSION BOARD, FOLLOW THESE STEPS:
17. Determine location and orientation for installing expansion memory chips using schematic memory map or manufacturer's technical reference.
18. Install memory chips on expansion board.
CAUTION: Integrated circuit chips are designed to fit in the socket holes a specific way. It is important that pin number one is matched to socket number one. Consult the manufacturers technical manual for specific information on the chip being used.
19. Set configuration switches on motherboard and expansion board to include added memory.
20. Replace computer cover.
21. Connect power cord and other peripheral cables.
22. Run RAM and ROM diagnostic tests to verify operation of the expansion memory.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics.
Describe static-handling procedures.
Use service manuals to determine procedures for removing and replacing chips.
Use technical references to identify specifications for electronic devices.
Use chip-swapping charts to identify compatible chips.
Identify and demonstrate the procedure for soldering and desoldering chips.
Identify and demonstrate the procedure for removing and replacing chips.
Identify the methods of installing expansion memory.
Define technical terms associated with soldering.
Define technical terms associated with integrated circuit chips.
Identify the types of integrated circuit chips.
Explain the operating principles and functions of RAM and ROM chips.
Interpret memory chip data, charts and technical information.
Explain the operating principles and functions of integrated circuit chips.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Expansion memory board Integrated circuit chips Chip puller Chip inserter
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 105. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install main memory
PERFORMANCE STANDARD	Main memory must pass diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Disconnect power cord and other peripheral cables.
3. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Be sure to discharge static from the body and avoid high static areas.

4. Determine type of memory expansion to be made:
   a. ROM - Read Only Memory.
   b. RAM - Random Access Memory.
5. Determine type, speed and size of memory chips necessary using manufacturer's manual.
6. Look up the chip identification code in a chip-swapping chart.
7. Select replacement memory chips.
8. Note chip location, orientation and other information.
9. Determine the method used to mount the chip to the board:
   a. Nonsoldered (press-in type).
   b. Soldered.

   NOTE: Refer to the analysis for Task 720-S-012-CR for the procedure to remove and replace both types of chips.
10. Determine location and orientation for installing expansion memory chips using schematic memory map.
11. Install memory chips on motherboard.

CAUTION: Integrated circuit chips are designed to fit in the socket holes a specific way. It is important that pin number one is matched to socket number one. Consult the manufacturer's technical manual for specific information on the chip being used.

12. Set configuration switches on motherboard to include added memory.
13. Replace computer cover.
14. Connect power cord and other peripheral cables.
15. Run motherboard RAM and ROM diagnostic tests to verify operation of the memory chips.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics. Describe static-handling procedures. Use service manuals to determine procedures for removing and replacing chips. Use technical references to identify specifications for electronic devices. Use chip-swapping charts to identify compatible chips. Identify and demonstrate the procedure for soldering and desoldering chips. Identify and demonstrate the procedure for removing and replacing chips. Identify the methods of installing expansion memory. Define technical terms associated with soldering. Define technical terms associated with integrated circuit chips. Identify the types of integrated circuit chips. Explain the operating principles and functions of RAM and ROM chips. Interpret memory chip data, charts and technical information. Explain the operating principles and functions of integrated circuit chips. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Integrated circuit chips
Chip puller
Chip inserter

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 106.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 1-B: Ability to perform operations with numbers with and without a calculator.
- Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.
- Goal 1-D: Ordering numbers.
- Goal 1-E: Application of properties of numbers and operations.
- Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.
- Goal 1-I: Use of number patterns.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install field-type product line
PERFORMANCE STANDARD	System must be upgraded to include most current manufacturing changes.
STEPS	1. Read and interpret manufacturer's field upgrade product information, work order, block diagrams and schematics to identify system to be upgraded and work to be performed. 2. Perform system upgrade to manufacturer's specifications. 3. Complete all necessary reports and paperwork noting upgrade performed, problems solved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.
KNOWLEDGE	Interpret manufacturer's upgrade information, product information, flowcharts, block diagrams and schematics. Define technical terms associated with field upgrades. Use service manuals to determine procedures for performing field upgrades. Use technical references to identify specifications for electronic devices. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Field upgrade parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 107.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-C: Costs and benefits of a particular course of action.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 3-A: Ethical practices which include:
  1. honesty and integrity in the recording and reporting of the results of scientific inquiry;
  2. disclosure, including open discussion of ideas, techniques and results;
  3. rights of subjects, humanness and respect for life.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install remote terminals

PERFORMANCE STANDARD Remote terminal equipment must be operational in conjunction with the main central processing unit.

STEPS

1. Determine equipment needed for remote terminal:
    a. Display screen/monitor.
    b. Keyboard.
    c. Storage devices.
    d. Data communication device.
    e. Interface cards.
    f. Peripheral devices.
    g. Peripheral cables.
   NOTE: Computer systems and networks vary. Consult the manufacturer's manual for the specific equipment and procedure to follow to install remote terminals.
2. Set up remote terminal equipment and interface it with the main central processing unit.
3. Power up the system and run diagnostic tests to verify operation of the remote terminals.
4. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Explain the operating principles and functions of remote terminals and computer networks.
Identify the types of remote terminals.
Identify the types of main central processing units used as host systems.
Identify the types of computer system networks.
Define technical terms associated with computer system networks.
Interpret flowcharts, block diagrams and schematics.
Interpret computer network data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Use service manuals to determine procedures for installing remote terminals.

KNOWLEDGE (Cont.)	Use technical references to identify specifications for computer networks. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Remote terminal equipment
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 108. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:

Goal 1-A: Recognition, recall, and summarization of material read.

Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.

Goal 1-F: Integration of information from more than one text.

Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.

Goal 3-E: Use of standard written English conventions.

Physical Development and Health:

Goal 3-A: Safe and appropriate use of equipment in physical activities.

Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:

Goal 5-B: Sources of information evaluated in terms of selective criteria.

Goal 5-C: Costs and benefits of a particular course of action.

Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

Goal 1-D: How two or more things interact and the effect each has on the other.

Goal 3-B: Basic scientific standards and research abilities which include:

1. accuracy, skill and safe practices in laboratory activities;
2. application of an operational definition using terms to physically describe the activity or result of a procedure;
3. good experimental techniques which will be evident by the precision practiced during the investigation;
4. systematization of data to maintain an orderly manner of review;
5. effectiveness in communicating laboratory procedures and results;
6. ability to analyze, evaluate or replicate the experimental work of others.

Mathematics:

Goal 1-A: Ability to read, write and name numbers in several different ways.

Goal 1-C: Ability to translate word problem situations to mathematical expressions or sentences and solve the sentences.

Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Install electrical wiring
PERFORMANCE STANDARD	Task analysis has shown that installing electrical wiring supplying power to computer system is not a job task normally performed by the computer repair technician. This task is covered in other parts of the curriculum.
STEPS	
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install keys on keyboard

PERFORMANCE STANDARD Each key on keyboard must transmit its designated signal to the central processing unit.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify work to be performed.
2. Identify malfunctioning keys.
3. Remove keyboard from computer.
4. Determine type of keyswitch on keyboard to be serviced:
   a. Screw-on.
   b. Snap-on.
   c. Sealed (unremovable) switch.
   NOTE: Computer keyboards vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace keys on keyboard.

IF THE KEYSWITCH IS THE SCREW-ON TYPE, FOLLOW THESE STEPS:

5. Turn keyboard over and locate keyswitch to be removed.
6. Desolder the connector pins on the back of the keyboard.
   NOTE: Do not apply the soldering tool to the back of the keyboard for more than three seconds at a time or damage to the tracers could occur.
7. Remove keyswitch retaining screw.
8. Turn keyboard right-side up and pull key cap/cover to remove assembly.
9. Read and interpret code or marking data on keyswitch, or determine replacement using manufacturer's manual.
10. Select replacement keyswitch.
11. Place keyswitch assembly onto keyboard with the contact pins through the holes.
12. Hold keyswitch assembly with one hand and turn keyboard over.
13. Replace keyswitch assembly retaining screw.
14. Solder contact pin to pad on back of keyboard.
15. Check soldered joint to make sure that the hole has completely filled with solder and that the solder has built up around the pin.
16. Attach keyboard to computer.
17. Power up computer and run diagnostic tests to verify operation of the new keyswitch.

STEPS (Cont.)

IF THE KEYSWITCH IS THE SNAP-ON TYPE, FOLLOW THESE STEPS:

18. Turn keyboard over and locate keyswitch to be removed.
19. Desolder the contact pins on the back of the keyboard. NOTE: Do not apply the soldering tool to the back of the keyboard for more than three seconds at a time or damage to the tracers could occur.
20. Turn keyboard over and remove key cap/cover.
21. Pinch the two clips on the keyswitch together and pull upon the keyswitch assembly to remove it.
22. Read and interpret code or marking data on keyswitch, or determine replacement using manufacturer's manual.
23. Select replacement keyswitch.
24. Thread the contact pins through the holes and snap the keyswitch assembly into place on the keyboard.
25. Replace the key cap/cover and turn the keyboard over.
26. Solder contact pins to the pad on the back of the keyboard.
27. Check soldered joint to make sure that the holes are completely filled with solder and that the pins are covered.
28. Attach keyboard to computer.
29. Power up computer and run diagnostic tests to verify operation of the new keyswitch.

KNOWLEDGE

Identify the types of keyswitches used in computer keyboards.
Identify the types of keyboards used with computers.
Explain the operating principles and functions of keyboards and keyswitches.
Define technical terms associated with keyboards.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement keyswitch
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 110. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents. Social Sciences: Goal 5-B: Sources of information evaluated in terms of selective criteria. Goal 5-I: Roles of the individual in the world of work. Mathematics: Goal 1-A: Ability to read, write and name numbers in several different ways. Goal 1-B: Ability to perform operations with numbers with and without a calculator. Goal 1-H: Application of computational and problem-solving skills to common life situations with or without calculators. Goal 3-E: Application of selected measurement systems, instruments, and techniques.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair keyboard

PERFORMANCE STANDARD Each key on keyboard must transmit its designated signal to the central processing unit.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the keyboard problem.
4. Remove keyboard from unit following procedure in Task 720-S-006-CRT "Install keyboard."
5. Run diagnostic tests to isolate the faulty parts and circuits.
6. Remove malfunctioning parts.
7. Repair malfunctioning parts if possible.
8. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
9. Select replacement parts.
10. Install repaired or replacement parts.
11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
13. Install repaired keyboard following procedure in Task 720-S-006-CRT "Install keyboard."
14. Power up system and run diagnostic tests to verify operation of the repaired keyboard.
15. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.

Define technical terms associated with keyboards.

Define technical terms associated with troubleshooting and repairing electronic devices.

Identify and demonstrate the procedures for troubleshooting and repairing keyboards.

KNOWLEDGE
(Cont.)

Explain the operating principles and functions of keyboards.

Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for servicing electronic devices.
Use technical references to identify specifications for electronic devices.
Interpret keyboard data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT
AND
MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement keyboard parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 111.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair motherboard

PERFORMANCE STANDARD Central processing unit must load and store data/information.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the motherboard.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the problem with the motherboard.
7. Locate motherboard and move any cables, ties or assemblies necessary to gain access to the motherboard.
8. Note and label the orientation on all connectors which are not keyed.
9. Unplug all cables connected to the motherboard.
10. Remove all peripheral boards necessary to gain access to the motherboard.
11. Remove malfunctioning parts.
12. Repair malfunctioning parts if possible.
13. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
14. Select replacement parts.
15. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
16. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
17. Install repaired or replacement parts.
18. Replace any peripheral boards, cables, ties or assemblies moved to gain access to the motherboard.
19. Replace cover, power cord and peripheral cables.
20. Power up system and run diagnostic tests to verify operation of the motherboard.

STEPS
(Cont.)

21. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with main circuit boards.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing main circuit boards.
Explain the operating principles and functions of main circuit boards.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing main circuit boards.
Use technical references to identify specifications for computer main circuit boards.
Interpret main circuit board data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 112.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 3-D: Conversion of units within one system and from one system to another.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 4-F: Ability to perform operations with algebraic expressions.

Goal 4-G: Interpretation of functions and their graphs.

Goal 6-A: Interpretation of data from an experiment.

Goal 6-B: Ability to estimate probabilities from experiments or from data.

Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-F: Appropriate application of words of quantification.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair analog board
PERFORMANCE STANDARD	Analog board must convert digital outputs to analog values and must pass all diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the analog board.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty parts and circuits.
7. Locate analog board and move any cables, ties or assemblies necessary to gain access to the analog board.
8. Note and label the orientation on all connectors which are not keyed.
9. Unplug all cables connected to the analog board.
10. Remove malfunctioning parts.
11. Repair malfunctioning parts if possible.
12. Read and interpret code or marking data on parts or determine replacement using manufacturer's manual.
13. Select replacement parts.
14. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
15. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
16. Install repaired or replacement parts.
17. Replace cover, power cord and peripheral cables.
18. Power up system and run diagnostic tests to verify operation of the repaired or replaced analog board.
19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with analog boards.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing analog boards.
Explain the operating principles and functions of analog boards.
Identify the types of wiring, plugs and connectors used with analog boards and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing analog boards.
Use technical references to identify specifications for analog boards.
Interpret analog board data, charts and technical information.
Identify, select and run analog board diagnostic tests.
Interpret analog board diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, *Computer Equipment Repair*, Performance Objective 113.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair disk drive assembly
PERFORMANCE STANDARD	Disk drive must read, write and verify data and must pass all diagnostic tests error free.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the disk drive.
   NOTE: Disk drive installation procedures are covered in the analyses of Tasks 720-S-010-CRT, 720-S-017-CRT, 720-S-022-CRT, 720-S-028-CRT and 720-S-034-CRT. Refer to those tasks for specific procedures.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate disk drive and move any cables, ties or assemblies necessary to gain access to the disk drive.
7. Note and label the orientation on all connectors which are not keyed.
8. Unplug all cables connected to the disk drive.
9. Run diagnostic tests to isolate the faulty disk drive parts and circuits.
   NOTE: Disk drives vary. Consult the manufacturer's manual for the specific procedure to follow to troubleshoot and repair the disk drive.
10. Remove malfunctioning parts.
11. Repair malfunctioning parts if possible.
12. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
13. Select replacement parts.
14. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
15. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
16. Install repaired or replacement parts.
17. Replace any cables, ties or assemblies moved to gain access to the disk drive.

STEPS
(Cont.)

18. Replace cover, power cord and peripheral cables.
19. Power up system and run diagnostic tests to verify operation of the repaired or replaced disk drive.
20. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other necessary information required.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with disk drives.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing disk drives.
Explain the operating principles and functions of disk drives.
Identify the types of wiring, plugs and connectors used with computer disk drives.
Use service manuals to determine procedures for troubleshooting and repairing disk drives.
Use technical references to identify specifications for disk drives.
Interpret disk drive data, charts and technical information.
Identify, select and run disk drive diagnostic tests.
Interpret disk drive diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Work effectively when time, tension or pressure are critical factors for successful performance.
Assume responsibility for own decisions and actions.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 114.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 3-D: Conversion of units within one system and from one system to another.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 4-F: Ability to perform operations with algebraic expressions.

Goal 4-G: Interpretation of functions and their graphs.

Goal 6-A: Interpretation of data from an experiment.

Goal 6-B: Ability to estimate probabilities from experiments or from data.

Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-F: Appropriate application of words of quantification.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair logic assembly

PERFORMANCE STANDARD Logic assembly must interpret and manipulate digital logic signals being processed by the central processing unit.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the logic assembly.
   NOTE: Installing logic assemblies, main and expansion memory is covered in the analyses of Tasks 720-S-011-CRT, 720-S-039-CRT and 720-S-040-CRT. Refer to these tasks for more information on logic assemblies.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty logic assembly parts and circuits.
7. Locate logic assembly and move any cables, ties or assemblies necessary to gain access to the logic assembly.
8. Note and label the orientation on all connectors which are not keyed.
9. Unplug all cables connected to the logic assembly.
10. Remove all peripheral boards necessary to gain access to the logic assembly.
11. Remove malfunctioning parts.
12. Repair malfunctioning parts if possible.
13. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
14. Select replacement parts.
15. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
16. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
17. Install repaired or replacement parts.
18. Replace any cables, ties or assemblies moved to gain access to logic assembly.

STEPS (Cont.)

19. Replace cover, power cord and peripheral cables.
20. Power up system and run diagnostic tests to verify operation of the repaired or replaced logic assembly.
21. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with logic assemblies.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing logic assemblies.
Explain the operating principles and functions of logic assemblies.
Identify the types of wiring, plugs and connectors used with computers, and logic assemblies.
Use service manuals to determine procedures for troubleshooting and repairing logic assemblies.
Use technical references to identify specifications for logic assemblies.
Interpret logic assembly data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

- Troubleshooting flowcharts
- Block diagrams and schematics
- Technical references
- Service manuals
- Test equipment
- Computer system
- Electronic technician's tool kit
- Diagnostic disk
- Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 115.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair on-off switch
PERFORMANCE STANDARD	On-off switch must be operational; equipment must power up when switch is turned on.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the on-off switch.
   NOTE: Installing on-off switch is covered in the analysis of Task 720-S-014-CRT. Refer to this task for information on on-off switches.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty switch parts.
7. Locate on-off switch and move any cables, ties or assemblies necessary to gain access to the on-off switch.
8. Note and label the orientation on all connectors which are not keyed.
9. Unplug all cables connected to the on-off switch.
10. Remove all peripheral boards necessary to gain access to the on-off switch.
11. Remove malfunctioning parts.
12. Repair malfunctioning parts if possible.
13. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
14. Select replacement parts.
15. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
16. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
17. Install repaired or replacement parts.
18. Replace any cables, ties or assemblies moved to gain access to on-off switch.
19. Replace cover, power cord and peripheral cables.

STEPS (Cont.)

20. Power up system and run diagnostic tests to verify operation of the repaired or replaced on-off switch.
21. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with switches.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing switches.
Explain the operating principles and functions of switches.
Identify the types of switches, wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing switches.
Use technical references to identify specifications for switches.
Interpret switch data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 116.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 3-D: Conversion of units within one system and from one system to another.
Goal 3-E: Application of selected measurement systems, instruments, and techniques.
Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
Goal 4-F: Ability to perform operations with algebraic expressions.
Goal 4-G: Interpretation of functions and their graphs.
Goal 6-A: Interpretation of data from an experiment.
Goal 6-B: Ability to estimate probabilities from experiments or from data.
Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
Goal 7-F: Appropriate application of words of quantification.
Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair mechanical assembly
PERFORMANCE STANDARD	Mechanical assembly must provide peripheral equipment with mechanical motion/power.
STEPS	1. Read and interpret work order, block diagrams and schematics to identify problem. 2. Obtain malfunctioning unit. 3. Run diagnostic tests to verify the problem with the mechanical assembly. 4. Disconnect power cord and peripheral cables. 5. Remove cover. 6. Run diagnostic tests to isolate the faulty mechanical parts. 7. Remove malfunctioning parts. 8. Repair malfunctioning parts if possible. 9. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual. 10. Select replacement parts. 11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear. 12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary. 13. Install repaired or replacement parts. 14. Align, adjust and lubricate parts according to manufacturer's specifications. 15. Replace cover, power cord and peripheral cables. 16. Power up system and run diagnostic tests to verify operation of the repaired or replaced mechanical assembly. 17. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.
KNOWLEDGE	Interpret flowcharts, block diagrams and schematics to troubleshoot and repair mechanical assemblies. Define technical terms associated with mechanical assemblies. Define technical terms associated with troubleshooting and repairing mechanical assemblies.

KNOWLEDGE (Cont.)

Identify and demonstrate the procedures for troubleshooting and repairing mechanical assemblies.
Explain the operating principles and functions of mechanical assemblies.
Use service manuals to determine procedures for troubleshooting and repairing mechanical assemblies.
Use technical references to identify specifications for mechanical assemblies.
Interpret mechanical assembly data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 117.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair printed circuit board

PERFORMANCE STANDARD Printed circuit board must pass all diagnostic tests error free.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the printed circuit board.
   NOTE: Installing printed circuit boards and chips are covered in the analyses of Tasks 720-S-007-CRT, 720-S-009-CRT 720-S-011-CRT, 720-S-012-CRT, 720-S-015-CRT, 720-S-025-CRT, 720-S-039-CRT, and 720-S-040-CRT. Refer to these tasks for information on printed circuit boards and memory chips.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty printed circuit board chips, parts and circuits.
7. Locate printed circuit boards and move any cables, ties or assemblies necessary to gain access to the boards.
8. Note and label the orientation on all connectors which are not keyed.
9. Unplug all cables connected to the printed circuit boards.
10. Remove all peripheral boards necessary to gain access to the printed circuit board.
11. Remove malfunctioning parts.
12. Repair malfunctioning parts if possible.
13. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
14. Select replacement parts.
15. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
16. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
17. Install repaired or replacement parts.

STEPS
(Cont.)

18. Replace any cables, ties or assemblies moved to gain access to the printed circuit board.
19. Replace cover, power cord and peripheral cables.
20. Power up system and run diagnostic tests to verify operation of the repaired or replaced printed circuit board.
21. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with printed circuit boards.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing printed circuit boards.
Explain the operating principles and functions of printed circuit boards.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing printed circuit boards.
Use technical references to identify specifications for printed circuit boards.
Interpret printed circuit board data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 118.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 2-A: Meaning of spoken messages.
- Goal 2-F: Effective and appropriate responses.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-C: Use of specific information or reasons to support and elaborate the main point.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-C: Costs and benefits of a particular course of action.
- Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair drive motor
PERFORMANCE STANDARD	Drive motor must operate without binding or overheating.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the drive motor.
   NOTE: Installing the drive motor is covered in the analysis of Task 720-S-017-CRT. Refer to this task for information on drive motors.
4. Run diagnostic tests to isolate the faulty drive motor parts.
5. Locate drive motor and move any cables, ties or assemblies necessary to gain access to the drive motor.
6. Note and label the orientation on all connectors which are not keyed.
7. Unplug all cables connected to the drive motor.
8. Remove all peripheral boards necessary to gain access to the drive motor.
9. Remove malfunctioning parts.
10. Repair malfunctioning parts if possible.
11. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
12. Select replacement parts.
13. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
14. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
15. Install repaired or replacement parts.
16. Replace any cables, ties or assemblies moved to gain access to the drive motor.
17. Replace cover, power cord and peripheral cables.
18. Power up system and run diagnostic tests to verify operation of the repaired or replaced drive motor.
19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics to troubleshoot and repair drive motors. Define technical terms associated with drive motors. Define technical terms associated with troubleshooting and repairing electronic devices. Identify and demonstrate the procedures for troubleshooting and repairing drive motors. Explain the operating principles and functions of drive motors. Use service manuals to determine procedures for troubleshooting and repairing drive motors. Use technical references to identify specifications for drive motors. Interpret drive motor data, charts and technical information. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 119.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair carriage assembly

PERFORMANCE STANDARD Printer carriage must move back and forth without sticking or jamming.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the carriage assembly.
   NOTE: Installing the printer carriage assembly is covered in the analysis of Task 720-S-020-CRT. Refer to this task for information on the carriage assembly.
4. Disconnect power cord and peripheral cables.
5. Remove cover.
6. Run diagnostic tests to isolate the faulty carriage assembly parts.
7. Remove malfunctioning parts.
8. Repair malfunctioning parts if possible.
9. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
10. Select replacement parts.
11. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
12. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
13. Install repaired or replacement parts.
14. Replace cover, power cord and peripheral cables.
15. Power up system and run diagnostic tests to verify operation of the repaired or replaced carriage assembly.
16. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair carriage assemblies.
Define technical terms associated with carriage assemblies.
Define technical terms associated with troubleshooting and repairing carriage assemblies.
Identify and demonstrate the procedures for troubleshooting and repairing carriage assemblies.
Explain the operating principles and functions of carriage assemblies.
Use service manuals to determine procedures for troubleshooting and repairing carriage assemblies.
Use technical references to identify specifications for carriage assemblies.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts
Printer

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 120.

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair paper feed assembly

PERFORMANCE STANDARD Paper feed assembly must feed paper straight through without bending, tearing or folding paper.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the paper feed assembly.
   NOTE: Installing the paper feed assembly is covered in the analysis of Task 720-S-021-CRT. Refer to this task for information on paper feed assembly.
4. Remove malfunctioning parts.
5. Repair malfunctioning parts if possible.
6. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
7. Select replacement parts.
8. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
9. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
10. Install repaired or replacement parts.
11. Replace cover, power cord and peripheral cables.
12. Power up system and run diagnostic tests to verify operation of the repaired or replaced paper feed assembly.
13. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair paper feed assemblies.

Define technical terms associated with paper feed assemblies.

Define technical terms associated with troubleshooting and repairing paper feed assemblies.

Identify and demonstrate the procedures for troubleshooting and repairing paper feed assemblies.

KNOWLEDGE (Cont.)

Explain the operating principles and functions of paper feed assemblies.
Use service manuals to determine procedures for troubleshooting and repairing paper feed assemblies.
Use technical references to identify specifications for paper feed assemblies.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts
Printer

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 121.
Team of incumbent workers.

ILLINOIS
STATE GOALS
FOR
LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair circuit/language card

PERFORMANCE STANDARD Circuit/language card must pass all diagnostic tests without errors.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the circuit/language card.
   NOTE: Installing the circuit/language card is covered in the analysis of Task 720-S-025-CRT. Refer to this task for more information on the circuit/language card.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate circuit/language card; mark and move any cables, ties or assemblies necessary to gain access to the circuit/language card.
7. Run diagnostic tests to isolate the faulty circuit/language card parts and circuits.
8. Remove the circuit/language card.
9. Remove malfunctioning parts.
10. Repair malfunctioning parts if possible.
11. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
12. Select replacement parts.
13. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
14. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
15. Install repaired or replacement circuit/language card and attach cables to card if necessary.
16. Replace any cables, ties or assemblies moved to gain access to circuit/language card.
17. Replace cover, power cord and peripheral cables.
18. Power up system and run diagnostic tests to verify operation of the repaired or replaced circuit/language card.

STEPS (Cont.)

19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with circuit/language cards.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing circuit/language cards.
Explain the operating principles and functions of circuit/language cards.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing circuit/language cards.
Use technical references to identify specifications for circuit/language cards.
Interpret circuit/language card data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 122.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair tape transport assembly

PERFORMANCE STANDARD Tape must feed through tape transport assembly without stretching, binding or tangling.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the tape transport assembly.
   NOTE: Installing the tape transport assembly is covered in the analysis of Task 720-S-027-CRT. Refer to this task for information on tape transport assembly.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty tape transport assembly parts and circuits.
7. Locate tape transport assembly; mark and move any cables, ties or assemblies necessary to gain access to the tape transport assembly.
8. Remove all peripheral boards necessary to gain access to the tape transport assembly.
9. Remove tape transport assembly.
10. Remove malfunctioning parts.
11. Repair malfunctioning parts if possible.
12. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
13. Select replacement parts.
14. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
15. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
16. Install repaired or replacement tape transport assembly.
17. Replace cover, power cord and peripheral cables.
18. Power up system and run diagnostic tests to verify operation of the repaired or replaced tape transport assembly.

STEPS (Cont.)

19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair tape transport assemblies.
Define technical terms associated with tape transport assemblies.
Define technical terms associated with troubleshooting and repairing mechanical devices.
Identify and demonstrate the procedures for troubleshooting and repairing tape transport assemblies.
Explain the operating principles and functions of tape transport assemblies.
Use service manuals to determine procedures for troubleshooting and repairing tape transport assemblies.
Use technical references to identify specifications for tape transport assemblies.
Interpret tape transport assembly data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals

EQUIPMENT AND MATERIALS (Cont.)	Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement parts
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 123. Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	Language Arts: Goal 1-A: Recognition, recall, and summarization of material read. Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose. Goal 1-F: Integration of information from more than one text. Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences. Goal 3-E: Use of standard written English conventions. Physical Development and Health: Goal 3-A: Safe and appropriate use of equipment in physical activities. Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns. Social Sciences: Goal 5-B: Sources of information evaluated in terms of selective criteria. Goal 5-I: Roles of the individual in the world of work. Biological and Physical Sciences: Goal 1-D: How two or more things interact and the effect each has on the other. Goal 1-I: Cause and effect relationships which allow predictions to be made. Mathematics: Goal 3-E: Application of selected measurement systems, instruments, and techniques. Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators. Goal 6-B: Ability to estimate probabilities from experiments or from data. Goal 6-I: Ability to design and conduct a simulation to gain information about a problem. Goal 7-E: Ability to determine what conclusions are valid from a given set of information. Goal 7-F: Appropriate application of words of quantification. Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem. Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair print mechanism

PERFORMANCE STANDARD Print mechanism must produce clean, clear and crisp lettering.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the print mechanism.
   NOTE: Installing the print mechanism is covered in the analysis of Task 720-S-019-CRT. Refer to this task for information on the print mechanism.
4. Power down printer.
5. Remove cover.
6. Remove ribbon cartridge.
7. Determine type of print mechanism:
   a. Dot matrix head.
   b. Ball or thimble.
   c. Daisy wheel.
8. Remove print mechanism from carrier:
   a. Dot matrix heads usually have retaining screws.
   b. Balls or thimbles usually have a retaining latch.
   c. Daisy wheels usually snap into position.
   NOTE: Printers vary. Consult the manufacturer's manual for the specific procedure to follow to remove and replace the print mechanism.
9. Repair malfunctioning parts if possible.
10. Read and interpret code or marking data on print mechanism, or determine replacement type style using manufacturer's manual.
11. Select replacement print mechanism.
12. Replace malfunctioning part with new or repaired part and adjust and lubricate according to manufacturer's specifications.
13. Replace ribbon cartridge.
14. Replace cover, power cord and cables.
15. Power up printer and print diagnostic test to verify print type and quality.

STEPS (Cont.)

16. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Define technical terms associated with print mechanisms and printers.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing print mechanisms.
Explain the operating principles and functions of print mechanisms.
Describe print commands, paper movement and special printer functions.
Use service manuals to determine procedures for troubleshooting and repairing print mechanisms.
Use technical references to identify specifications for print mechanisms.
Interpret print mechanism data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals

EQUIPMENT AND MATERIALS (Cont.)

- Test equipment
- Computer system
- Electronic technician's tool kit
- Diagnostic disk
- Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 124.

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  - Goal 1-F: Integration of information from more than one text.
  - Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
  - Goal 3-E: Use of standard written English conventions.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
  - Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.
- Social Sciences:
  - Goal 5-B: Sources of information evaluated in terms of selective criteria.
  - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
  - Goal 1-D: How two or more things interact and the effect each has on the other.
  - Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Mathematics:
  - Goal 3-D: Conversion of units within one system and from one system to another.
  - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  - Goal 6-A: Interpretation of data from an experiment.
  - Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
  - Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
  - Goal 7-F: Appropriate application of words of quantification.
  - Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair read/write/verify head
PERFORMANCE STANDARD	Disk drive must function to store, recall and verify data and pass all diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the disk drive read/write/verify head.
   NOTE: Installing the disk drive read/write/verify head is covered in the analysis of Task 720-S-028-CRT. Refer to this task for information on removing and replacing the disk drive read/write/verify head.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate disk drive read/write/verify head; mark and move any cables, ties or assemblies necessary to gain access to the disk drive read/write/verify head.
7. Unplug all cables connected to the disk drive read/write/verify head.
8. Remove all peripheral boards necessary to gain access to the disk drive read/write/verify head.
9. Remove malfunctioning parts.
10. Repair malfunctioning parts if possible.
11. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
12. Select replacement parts.
13. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
14. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
15. Install repaired or replacement disk drive read/write/verify head.
16. Replace any cables, ties or assemblies moved to gain access to the disk drive read/write/verify head.
17. Replace cover, power cord and peripheral cables.

STEPS (Cont.)

18. Power up system and run diagnostic tests to verify operation of the repaired or replaced disk drive read/write/verify head.
19. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with disk drive heads.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing disk drive read/write/verify heads.
Explain the operating principles and functions of disk drive read/write/verify heads.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing disk drive heads.
Use technical references to identify specifications for disk drive read/write/verify heads.
Interpret disk drive read/write/verify head data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 125.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Mathematics:

Goal 3-D: Conversion of units within one system and from one system to another.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 4-F: Ability to perform operations with algebraic expressions.

Goal 4-G: Interpretation of functions and their graphs.

Goal 6-A: Interpretation of data from an experiment.

Goal 6-B: Ability to estimate probabilities from experiments or from data.

Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-F: Appropriate application of words of quantification.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair ribbon assembly
PERFORMANCE STANDARD	NOTE: Analysis of this task has shown that ribbon assemblies are not repaired: they are replaced. Refer to Task 720-S-030-CRT "Install ribbon assembly" for the procedure.
STEPS	
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair ejector mechanism

PERFORMANCE STANDARD Disk must eject when disk drive door is opened.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the disk drive ejector mechanism.
   NOTE: Installing the disk drive ejector mechanism is covered in the analysis of Task 720-S-034-CRT. Refer to this task for information on the disk drive ejector mechanism.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate disk drive; mark and move any cables, ties or assemblies necessary to gain access to the disk drive ejector mechanism.
7. Remove all peripheral boards necessary to gain access to the disk drive ejector mechanism.
8. Remove malfunctioning parts.
9. Repair malfunctioning parts if possible.
10. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
11. Select replacement parts.
12. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
13. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
14. Install repaired or replacement disk drive ejector mechanism.
15. Replace any cables, ties or assemblies moved to gain access to the disk drive ejector mechanism.
16. Replace cover, power cord and peripheral cables.
17. Power up system and run diagnostic tests to verify operation of the repaired or replaced disk drive ejector mechanism.

STEPS (Cont.)	18. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.
KNOWLEDGE	Interpret flowcharts, block diagrams and schematics to troubleshoot and repair disk drive ejector mechanisms. Define technical terms associated with disk drive ejector mechanisms. Define technical terms associated with troubleshooting and repairing electromechanical devices. Identify and demonstrate the procedures for troubleshooting and repairing disk drive ejector mechanisms. Explain the operating principles and functions of disk drive ejector mechanisms. Identify the types of wiring, plugs and connectors used with computer and peripheral devices. Use service manuals to determine procedures for troubleshooting and repairing disk drive ejector mechanisms. Use technical references to identify specifications for disk drive ejector mechanisms. Interpret disk drive ejector mechanism data, charts and technical information. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 127.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  - Goal 1-F: Integration of information from more than one text.
  - Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
  - Goal 3-E: Use of standard written English conventions.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
  - Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.
- Social Sciences:
  - Goal 5-B: Sources of information evaluated in terms of selective criteria.
  - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
  - Goal 1-D: How two or more things interact and the effect each has on the other.
  - Goal 1-I: Cause and effect relationships which allow predictions to be made.
  - Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.
- Mathematics:
  - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  - Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
  - Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
  - Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair peripheral controls

PERFORMANCE STANDARD Peripheral controls must be functional; selector knobs, switches and lights must work and control the peripheral devices they are connected to.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the peripheral controls.
   NOTE: Installing peripheral controls is covered in the analysis of Task 720-S-037-CRT. Refer to this task for more information on peripheral controls.
4. Remove peripheral cables between central processing unit, peripheral control unit and peripheral device.
5. Remove cover.
6. Remove malfunctioning parts.
7. Repair malfunctioning parts if possible.
8. Read and interpret code or marking data on part,or determine replacement using manufacturer's manual.
9. Select replacement parts.
10. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
11. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
12. Install repaired or replacement parts.
13. Replace cover, power cord and peripheral cables.
14. Power up system and run diagnostic tests to verify operation of the repaired peripheral controls.
15. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.

Define technical terms associated with peripheral control units.

KNOWLEDGE (Cont.)	Define technical terms associated with troubleshooting and repairing electronic devices. Identify and demonstrate the procedures for troubleshooting and repairing peripheral control units. Explain the operating principles and functions of peripheral control units. Identify the types of wiring, plugs and connectors used with computer and peripheral devices. Use service manuals to determine procedures for troubleshooting and repairing peripheral controls. Use technical references to identify specifications for peripheral control units. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-olving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement parts
SOURCE OF ANALYSIS	V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 128. Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
    - Goal 1-A: Recognition, recall, and summarization of material read.
    - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
    - Goal 1-F: Integration of information from more than one text.
    - Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
    - Goal 3-E: Use of standard written English conventions.
- Physical Development and Health:
    - Goal 3-A: Safe and appropriate use of equipment in physical activities.
    - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
    - Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.
- Social Sciences:
    - Goal 5-B: Sources of information evaluated in terms of selective criteria.
    - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
    - Goal 1-C: Fundamental units used to express the structure of nature.
    - Goal 1-D: How two or more things interact and the effect each has on the other.
    - Goal 1-F: Characteristics of energy and matter.
    - Goal 1-I: Cause and effect relationships which allow predictions to be made.
    - Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.
- Mathematics:
    - Goal 3-D: Conversion of units within one system and from one system to another.
    - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
    - Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
    - Goal 4-F: Ability to perform operations with algebraic expressions.
    - Goal 4-G: Interpretation of functions and their graphs.
    - Goal 6-A: Interpretation of data from an experiment.
    - Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
    - Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
    - Goal 7-F: Appropriate application of words of quantification.
    - Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
    - Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair data communications adapter

PERFORMANCE STANDARD Data communications adapter must enable data communication equipment to operate in conjunction with system and must pass all diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the data communications adapter.
   NOTE: Installing the data communications adapter is covered in the analysis of Task 720-S-038-CRT. Refer to this task for information on the data communications adapter.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Remove malfunctioning parts.
7. Repair malfunctioning parts if possible.
8. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
9. Select replacement parts.
10. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
11. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
12. Install repaired or replacement parts.
13. Replace cover, power cord and peripheral cables.
14. Power up system and run diagnostic tests to verify operation of the repaired or replaced data communications adapter.
15. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices. Define technical terms associated with data communications adapters. Define technical terms associated with troubleshooting and repairing electronic devices. Identify and demonstrate the procedures for troubleshooting and repairing data communications adapters. Explain the operating principles and functions of data communications adapters. Identify the types of wiring, plugs and connectors used with computer and peripheral devices. Use service manuals to determine procedures for troubleshooting and repairing data communications adapters. Use technical references to identify specifications for data communications adapters. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Work effectively with people of different personalities. Complete assignments accurately and on time. Assume responsibility for own decisions and actions. Work effectively when time, tension or pressure are critical factors for successful performance. Plan and complete activities at one's own initiation. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 129.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair expansion memory
PERFORMANCE STANDARD	Expanded memory must pass diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the expanded memory.
   NOTE: Installing expanded memory is covered in the analysis of Task 720-S-039-CRT. Refer to this task for information on expanded memory.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty chips or circuits.
   a. RAM integrated circuit chips.
   b. ROM integrated circuit chips.
7. Determine type, speed and size of memory chips necessary using manufacturer's manual.
8. Look up the chip identification code in a chip-swapping chart.
9. Select replacement memory chips.
10. Note chip location, orientation and other information.
11. Replace malfunctioning memory chip with new memory chip following procedures in Task 720-S-039-CRT.
12. Replace cover, power cord and peripheral cables.
13. Power up system and run RAM and ROM diagnostic tests to verify operation of the expansion memory.
14. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with expanded memory.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing expanded memory.
Explain the operating principles and functions of expanded memory.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing expanded memory.
Use technical references to identify specifications for expanded memory.
Interpret chip data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement chips

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 130.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair memory

PERFORMANCE STANDARD Main memory must pass diagnostic tests without errors.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the main memory.
   NOTE: Installing main memory is covered in the analysis of Task 720-S-040-CRT. Refer to this task for information on main memory.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Run diagnostic tests to isolate the faulty chips and circuits:
   a. RAM integrated circuit chips.
   b. ROM integrated circuit chips.
7. Determine type, speed and size of memory chips necessary using manufacturer's manual.
8. Look up the chip identification code in a chip-swapping chart.
9. Select replacement memory chips.
10. Note chip location, orientation and other information.
11. Replace malfunctioning memory chip with new memory chip following procedures in Task 720-S-040-CRT.
12. Replace cover, power cord and peripheral cables.
13. Power up system and run RAM and ROM diagnostic tests to verify operation of the main memory.
14. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with main memory.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing main memory.
Explain the operating principles and functions of main memory.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing main memory.
Use technical references to identify specifications for main memory chips.
Interpret memory chip data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement chips

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 131.

Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Repair field type product line
PERFORMANCE STANDARD	Field upgrade must be functional according to manufacturing changes.

STEPS

1. Read and interpret equipment history file, manufacturer's upgrade information, work order, block diagrams and schematics to identify the nature and purpose of the change and to identify the problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the field upgrade product.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Remove malfunctioning parts.
7. Repair malfunctioning parts if possible.
8. Read and interpret code or marking data on part, or determine replacement using manufacturer's manual.
9. Select replacement parts.
10. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
11. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
12. Install repaired or replacement field upgrade product.
13. Replace cover, power cord and peripheral cables.
14. Power up system and run diagnostic tests to verify operation of the repaired or replaced field upgrade product.
15. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with field upgrade products.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing field upgrade products.
Explain the types, operating principles and functions of field upgrade products.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals, equipment history files and manufacturer's upgrade information to determine procedures for troubleshooting and repairing field upgrade products.
Use technical references and equipment history files to identify specifications for field upgrade products.
Interpret field upgrade product data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit

EQUIPMENT AND MATERIALS (Cont.)

Diagnostic disk
Replacement parts
Equipment history file
Manufacturer's field upgrade information

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 132.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair remote terminals

PERFORMANCE STANDARD Remote terminal equipment must be operational in conjunction with the main central processing unit.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify and isolate the problem with the remote terminal equipment:
    a. Display screen/monitor.
    b. Keyboard.
    c. Storage devices.
    d. Data communications device.
    e. Interface cards.
    f. Peripheral devices.
    g. Peripheral cables.
    h. Other.

    NOTE: Remote terminal equipment varies. Consult the manufacturer's manual for the specific procedure to follow to troubleshoot and repair the remote terminal equipment.
4. Troubleshoot and repair or replace malfunctioning or broken part/equipment following procedures outlined in other tasks in this duty area.
5. Power up system and run diagnostic tests to verify operation of the repaired or replaced remote terminal equipment.
6. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.

Define technical terms associated with remote terminal equipment and computer networks.

Define technical terms associated with troubleshooting and repairing electronic devices.

KNOWLEDGE
(Cont.)

Identify and demonstrate the procedures for troubleshooting and repairing remote terminal equipment and computer networks.
Explain the operating principles and functions of remote terminal equipment and computer networks.
Identify the types of computer system networks.
Identify the types of remote terminal equipment.
Identify the types of main central processing units used as host systems.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing remote terminal equipment.
Use technical references to identify specifications for remote terminal equipment and computer networks.
Interpret remote terminal equipment and computer network data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT
AND
MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts
Remote terminal equipment

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 133.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Identify integrated circuit chips
PERFORMANCE STANDARD	Analysis of this task has shown that it is a step in Task 720-S-002-CRT "Interpret chip-swapping charts." Refer to this task for more information.
STEPS	
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Identify machine components and test points
PERFORMANCE STANDARD	Machine components must be identified and test points for each component must be located.

STEPS

1. Read and interpret work order, block diagrams, service manuals, technical references or schematics to identify machine/system components and test points.
   NOTE: Computer systems and machines vary. Consult the manufacturer's manual to identify and locate the specific machine/system components and test points.
2. Locate the hot test points, points where current or signal is carried, for each component:
   - a. Power supply outlets.
   - b. Labelled test point pin.
   - c. Signal trace.
   - d. Component leg.
   - e. Connector pin.
   - f. Insulated wire.
   - g. Other.

CAUTION: Care must be taken not to touch more than one test point at a time with the test probe or a short circuit could result.

3. Locate the ground test points, points which are grounded to the outside world, usually through the third prong of the AC plug:
   - a. Metal frame or chassis.
   - b. Grounding traces on circuit board.
   - c. Ground leads on motors, solenoids and case.
   - d. Grounded test pin on circuit board.
   - e. Logic ground on TTL logic circuit.
   - f. Signal ground on a link between two pieces of equipment.
   - g. Other.

   NOTE: Use ground closest to test point for most accurate reading.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to identify machine/system components and locate test points.
Define technical terms associated with test points.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify machine/system components.
Identify and locate machine/system test points.
Explain the operating principles and functions of hot and ground test points.
Identify and locate machine/system hot test points.
Identify and locate machine/system ground test points.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals and technical references to identify and locate test points.
Interpret test point data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 135.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:

- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Set configuration switches

PERFORMANCE STANDARD Configuration switches must be set according to system specifications, and all equipment must operate as one unit.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify switch location and settings.
2. Obtain system.
3. Disconnect power cord and peripheral cables.
4. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

NOTE: Computer network systems and printers vary. Consult the manufacturer's manual for the specific procedure to follow to locate and set the configuration switches for both the host system and all peripheral devices.

5. Locate configuration switches; mark and move any cables, ties or assemblies necessary to gain access to the configuration switches.
6. Remove all peripheral boards necessary to gain access to the configuration switches.
7. Set switches to match configuration in manufacturer's manual or technical reference.
8. Replace any cables, ties or assemblies moved to gain access to configuration switches.
9. Replace cover, power cord and peripheral cables.
10. Repeat steps 3-9 for each peripheral device connected to the system.
11. Power up system and run system diagnostic tests and printer tests to verify operation of the system.
12. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, labor time spent, changes to service and/or technical manuals, customer education and other necessary information required.

KNOWLEDGE	Interpret flowcharts, block diagrams and schematics to identify and locate configuration switches. Define technical terms associated with configuration switches. Define technical terms associated with computer networks. Identify types of computer equipment and peripheral equipment that use configuration switches. Identify and demonstrate the procedures for setting configuration switches. Explain the operating principles and functions of configuration switches. Use service manuals to determine location of and procedures for setting configuration switches. Use technical references to identify specifications for configuration switches. Interpret configuration switch data, charts and technical information. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems.
ATTITUDES	Display pride in workmanship. Work without the need for close supervision. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information. Display respect for tools, equipment and machines. Follow written and oral directions. Focus attention to details. In addition, refer to Employability Skills List.
SAFETY	Apply general shop safety practices. Maintain a clean and orderly work area. Identify and follow safety requirements for working with electronic equipment.
EQUIPMENT AND MATERIALS	Troubleshooting flowcharts Block diagrams and schematics Technical references Service manuals Test equipment Computer system Electronic technician's tool kit Diagnostic disk

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objectives 136 & 137.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 1-A: Ability to read, write and name numbers in several different ways.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Set user switches
PERFORMANCE STANDARD	Analysis of this task has shown that it is a part of Task 720-S-070-CRT "Set configuration switches." Refer to that task for information on setting switches.
STEPS	
KNOWLEDGE	
ATTITUDES	
SAFETY	
EQUIPMENT AND MATERIALS	
SOURCE OF ANALYSIS	Team of incumbent workers.
ILLINOIS STATE GOALS FOR LEARNING	

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Install mechanical assembly

PERFORMANCE STANDARD Mechanical assembly must be installed to provide peripheral equipment with mechanical motion/power.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify mechanical assembly to be installed.
2. Obtain unit.
3. Disconnect power cord and peripheral cables.
4. Remove cover.
5. Locate mechanical assembly; mark and move any cables, ties or assemblies necessary to gain access to the mechanical assembly.
6. Remove all peripheral boards necessary to gain access to the mechanical assembly.
7. Remove mechanical assembly from printer.
8. Read and interpret code or marking data on mechanical assembly or determine replacement using manufacturer's manual.
9. Install mechanical assembly.
10. Align, adjust and lubricate parts according to the manufacturer's specifications.
11. Replace any cables, ties or assemblies moved to gain access to mechanical assembly.
12. Replace cover, power cord and peripheral cables.
13. Power up system and run diagnostic tests to verify operation of the repaired or replaced mechanical assembly.
14. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to remove and replace parts in electronic devices.
Define technical terms associated with mechanical assemblies.
Identify and demonstrate the procedures for removing and replacing mechanical assemblies.
Explain the operating principles and functions of mechanical assemblies.
Use service manuals to determine procedures to remove and replace mechanical assemblies.
Use technical references to identify specifications for mechanical assemblies.
Interpret mechanical assembly data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement mechanical assembly

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 138.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

- Language Arts:
  - Goal 1-A: Recognition, recall, and summarization of material read.
  - Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
  - Goal 1-F: Integration of information from more than one text.
  - Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
  - Goal 3-E: Use of standard written English conventions.
- Physical Development and Health:
  - Goal 3-A: Safe and appropriate use of equipment in physical activities.
  - Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
  - Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.
- Social Sciences:
  - Goal 5-B: Sources of information evaluated in terms of selective criteria.
  - Goal 5-I: Roles of the individual in the world of work.
- Biological and Physical Sciences:
  - Goal 1-D: How two or more things interact and the effect each has on the other.
  - Goal 1-I: Cause and effect relationships which allow predictions to be made.
  - Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.
- Mathematics:
  - Goal 3-D: Conversion of units within one system and from one system to another.
  - Goal 3-E: Application of selected measurement systems, instruments, and techniques.
  - Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
  - Goal 4-F: Ability to perform operations with algebraic expressions.
  - Goal 4-G: Interpretation of functions and their graphs.
  - Goal 6-A: Interpretation of data from an experiment.
  - Goal 6-B: Ability to estimate probabilities from experiments or from data.
  - Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
  - Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
  - Goal 7-F: Appropriate application of words of quantification.
  - Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
  - Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Perform operator duties

PERFORMANCE STANDARD Operator duties include powering up the system, loading the disk drive, booting the system, loading the printer with paper and changing the ribbon.

NOTE: Operator duties vary from workplace to workplace and from computer system to computer system. These duties are a minimum which are common to most systems and workplaces.

STEPS

1. Power up system:
   a. Plug in AC power cord and turn on power strip if necessary.
   b. Switch on printer.
   c. Switch on computer.
   d. Switch on monitor.
   e. Switch on any other peripheral devices if necessary.
2. Load disk drive and boot computer:
   a. Insert boot disk in drive and close door.
   b. Load operating system.
   c. Remove boot disk from drive.
   d. Insert program disk in drive and close door.
   e. Run program.
   NOTE: Computer systems vary. Many systems use an internal hard disk drive which will boot the computer (load the operating system) upon power up. Hard disk drives will also contain the programs to be run which means that the operator will only have to complete step "e" above.
3. Determine type of paper feed and load paper in printer:
   a. Tray or bin feed.
   b. Tractor feed.

IF PAPER FEED IS THE TRAY OR BIN TYPE, FOLLOW STEPS 4-6.

4. Remove tray from sheet feed mechanism.
5. Fan paper and load it in tray following manufacturer's instructions.
6. Replace tray in sheet feed mechanism.

STEPS
(Cont.)

IF PAPER FEED IS THE TRACTOR TYPE, FOLLOW STEPS 7-10.

7. Insert paper from rear or bottom and turn paper feed knob clockwise until paper appears between the platen and the print head.
8. Lift up the friction bar roller bar and open the tractor covers on each side.
9. Align the paper guide holes with the paper feed pins on the tractor wheels and close the tractor covers.
10. Lower the friction roller bar.

TO CHANGE THE PRINTER RIBBON, FOLLOW STEP 11.

11. Change printer ribbon.
    NOTE: Refer to task 720-S-030-CRT "Install printer ribbon" for detailed information on printer ribbons.

KNOWLEDGE

Define technical terms associated with computers and peripheral devices.
Identify and demonstrate the procedures for booting a computer and running a program.
Identify and demonstrate the procedure for loading a printer with paper and changing printer ribbons.
Explain the operating principles and functions of computer operating systems and computer programs.
Use service manuals and technical references to determine procedures for booting a computer, running programs, loading a printer with paper and changing ribbons.
Interpret computer and printer data, charts and technical information.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 139.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Realign read/write/verify head
PERFORMANCE STANDARD	Disk drive must function to store, recall and verify data and must pass all diagnostic tests without error.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the read/write/verify head.
4. Disconnect peripheral cables.
5. Remove cover.
6. Set up dual trace oscilloscope.
7. Connect Channel B to head test point one and to ground.
8. Connect Channel A to head test point two and to ground.
9. Connect external trigger probe to the sync signal test point.
10. Insert exerciser disk into drive and boot system and load exerciser program.
11. Remove exerciser disk and insert alignment disk into drive.
12. Start head reading at a track near the center of the disk.
    NOTE: Oscilloscope signals from channels A and B will be shown. When both signals are equal, the drive head is in alignment.
13. Adjust the stepper motor pulley:
    a. Loosen set screws that hold the pulley in place.
    b. Slowly turn the pulley until the two trace signals on the oscilloscope are equal.
    c. Tighten the set screws.
14. Adjust the stepper motor:
    a. Loosen stepper motor mounting screws.
    b. Slowly turn stepper motor until trace signals are equal.
    c. Tighten mounting screws.
15. Step the head in three tracks and then step it back after adjustment is complete; recheck head alignment.
16. Step head three tracks out and then step it back after adjustment is complete; recheck head alignment.
17. Readjust if necessary.
18. Remove oscilloscope.

STEPS (Cont.)

19. Replace cover and attach peripheral cables.
20. Power up system and run diagnostic tests to verify operation of the adjusted read/write/verify head.
21. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with disk drive read/write/verify heads.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for realigning disk drive read/write/verify heads.
Explain the operating principles and functions of disk drive read/write/verify heads.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for aligning disk drive read/write/verify heads.
Use technical references to identify specifications for disk drive read/write/verify heads.
Interpret disk drive read/write/verify head data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 140.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

ILLINOIS STATE GOALS FOR LEARNING (Cont.)

Mathematics:

Goal 3-D: Conversion of units within one system and from one system to another.

Goal 3-E: Application of selected measurement systems, instruments, and techniques.

Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.

Goal 4-F: Ability to perform operations with algebraic expressions.

Goal 4-G: Interpretation of functions and their graphs.

Goal 6-A: Interpretation of data from an experiment.

Goal 6-B: Ability to estimate probabilities from experiments or from data.

Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.

Goal 7-E: Ability to determine what conclusions are valid from a given set of information.

Goal 7-F: Appropriate application of words of quantification.

Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.

Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Adjust motor speed

PERFORMANCE STANDARD Motor speed must be adjusted to prevent slippage or binding of motor.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the motor.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate motor; mark and move any cables, ties or assemblies necessary to gain access to the motor.
7. Locate motor speed adjustment screw.
8. Power up equipment.
9. When the part is binding, turn the potentiometer adjusting screw to speed up the motor.
10. When the part is slipping, turn the potentiometer adjusting screw to slow the motor down.
11. Adjust motor.
12. Replace any cables, ties or assemblies moved to gain access to motor.
13. Replace cover, power cord and peripheral cables.
14. Power up system and run diagnostic tests to verify operation of the adjusted motor.
15. Complete all necessary reports and paperwork noting problems resolved, problems not resolved, parts used, labor time spent, changes to service and/or technical manuals, customer education and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with adjusting motor speed.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for adjusting motor speed.
Explain the operating principles and functions of adjusting motor speed.
Use service manuals to determine procedures for adjusting motor speed.
Use technical references to identify specifications for adjusting the motor speed.
Interpret motor speed data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 141.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING	Language Arts:

Language Arts:

- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:

- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:

- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:

- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION	Computer Repair Technician
DUTY AREA	Servicing Computer Equipment
TASK	Check AC power source
PERFORMANCE STANDARD	AC power source must be checked to determine if voltage is present.
STEPS	1. Check outlet for power by placing the test probes/prongs directly into outlet sockets and the ground socket. NOTE: Test light will light up if power is present. 2. Check the service panel for a blown fuse or tripped circuit breaker. If power is not present at the receptacle. 3. Unscrew retaining screw from receptacle cover plate and remove plate. If service panel is not the problem. 4. Place the test probes/prongs of the voltage tester or meter on the bare ends of the black and the white wires, at the point where they are connected to the receptacle. Check both sets of wires in this manner. NOTE: If the tester bulb lights or volt meter arm moves, there is power present at the receptacle.
KNOWLEDGE	Define technical terms associated with checking the AC power source. Identify and demonstrate the procedures for checking the AC power source. Explain the functions of checking the AC power source. Describe causes of AC power source interruptions. Describe how power surges, power outages, blown fuses, tripped circuits, circuit overloads and faulty wiring affect the AC power source. Identify the types of wiring, plugs and connectors used with AC power sources. Use service manuals to determine procedures for checking the AC power source. Use technical references to identify specifications for AC power sources. Identify, select and run diagnostic tests. Interpret diagnostic test results. Identify and apply the problem-solving model. Recognize, analyze and solve or refer problems. Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
AC power source

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 142.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

ILLINOIS
STATE GOALS
FOR
LEARNING
(Cont.)

Biological and Physical Sciences:

- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-D: How two or more things interact and the effect each has on the other.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.
- Goal 1-J: Cycles in which conditions or events are repeated at regular intervals.

Mathematics:

- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-F: Appropriate application of words of quantification.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.

TASK ANALYSIS

OCCUPATION Computer Repair Technician

DUTY AREA Servicing Computer Equipment

TASK Repair power supply

PERFORMANCE STANDARD Power supply must power-up the computer when the power switch is turned on.

STEPS

1. Read and interpret work order, block diagrams and schematics to identify problem.
2. Obtain malfunctioning unit.
3. Run diagnostic tests to verify the problem with the power supply.
   NOTE: Installing the power supply is covered in the analysis of Task 720-S-008-CRT. Refer to this task for information on removing and replacing the power supply.
4. Disconnect power cord and peripheral cables.
5. Remove cover.

CAUTION: Static electricity can cause damage to integrated circuit chips. Follow all antistatic procedures, discharge static from the body and avoid high static areas.

6. Locate power supply; mark and move any cables, ties or assemblies necessary to gain access to the power supply.
7. Remove all peripheral boards necessary to gain access to the power supply.
8. Remove malfunctioning power supply.
9. Repair malfunctioning power supply if possible.
10. Read and interpret code or marking data on power supply, or determine replacement using manufacturer's manual.
11. Select replacement power supply.
12. Check all connectors, plugs, sockets, terminals and wires for corrosion and wear.
13. Clean or replace connectors, plugs, sockets, terminals and wires if necessary.
14. Install repaired or replacement power supply.
15. Replace any cables, ties or assemblies moved to gain access to the power supply.
16. Replace cover, power cord and peripheral cables.
17. Power up system and run diagnostic tests to verify operation of the repaired or replaced power supply.
18. Complete all necessary reports and paperwork noting parts used, labor time spent and other required information.

KNOWLEDGE

Interpret flowcharts, block diagrams and schematics to troubleshoot and repair electronic devices.
Define technical terms associated with power supplies.
Define technical terms associated with troubleshooting and repairing electronic devices.
Identify and demonstrate the procedures for troubleshooting and repairing power supplies.
Explain the operating principles and functions of power supplies.
Identify the types of wiring, plugs and connectors used with computer and peripheral devices.
Use service manuals to determine procedures for troubleshooting and repairing power supplies.
Use technical references to identify specifications for power supplies.
Interpret power supply data, charts and technical information.
Identify, select and run diagnostic tests.
Interpret diagnostic test results.
Identify and apply the problem-solving model.
Recognize, analyze and solve or refer problems.
Apply mathematics for problem solving.

ATTITUDES

Display pride in workmanship.
Work without the need for close supervision.
Work effectively with people of different personalities.
Complete assignments accurately and on time.
Assume responsibility for own decisions and actions.
Work effectively when time, tension or pressure are critical factors for successful performance.
Plan and complete activities at one's own initiation.
Display respect for tools, equipment and machines.
Follow written and oral directions.
Focus attention to details.
In addition, refer to Employability Skills List.

SAFETY

Apply general shop safety practices.
Maintain a clean and orderly work area.
Identify and follow safety requirements for working with electronic equipment.

EQUIPMENT AND MATERIALS

Troubleshooting flowcharts
Block diagrams and schematics
Technical references
Service manuals
Test equipment
Computer system
Electronic technician's tool kit
Diagnostic disk
Replacement parts

SOURCE OF ANALYSIS

V-TECS Curriculum Guide, Computer Equipment Repair, Performance Objective 143.
Team of incumbent workers.

ILLINOIS STATE GOALS FOR LEARNING

Language Arts:
- Goal 1-A: Recognition, recall, and summarization of material read.
- Goal 1-C: Reading for various purposes and identification of text to accomplish each purpose.
- Goal 1-F: Integration of information from more than one text.
- Goal 3-A: Use of appropriate language and style in writing for a variety of purposes and audiences.
- Goal 3-E: Use of standard written English conventions.

Physical Development and Health:
- Goal 3-A: Safe and appropriate use of equipment in physical activities.
- Goal 3-G: Safety procedures at home, workplace, school, and recreation sites for the prevention of fires, poisoning, drowning, and other accidents.
- Goal 6-J: Ability to adapt acquired complex motor skills into new movement patterns.

Social Sciences:
- Goal 5-B: Sources of information evaluated in terms of selective criteria.
- Goal 5-I: Roles of the individual in the world of work.

Biological and Physical Sciences:
- Goal 1-C: Fundamental units used to express the structure of nature.
- Goal 1-F: Characteristics of energy and matter.
- Goal 1-I: Cause and effect relationships which allow predictions to be made.

Mathematics:
- Goal 3-D: Conversion of units within one system and from one system to another.
- Goal 3-E: Application of selected measurement systems, instruments, and techniques.
- Goal 4-D: Ability to evaluate, solve, and apply formulas with and without calculators.
- Goal 4-F: Ability to perform operations with algebraic expressions.
- Goal 4-G: Interpretation of functions and their graphs.
- Goal 6-A: Interpretation of data from an experiment.
- Goal 6-B: Ability to estimate probabilities from experiments or from data.
- Goal 6-I: Ability to design and conduct a simulation to gain information about a problem.
- Goal 7-E: Ability to determine what conclusions are valid from a given set of information.
- Goal 7-G: Application of problem-solving procedures to solve or suggest a solution to a given problem.
- Goal 7-H: Use of mental arithmetic to estimate results of computations.